University of Alberta

The Use of Computers by Managers, and the Role of Business Schools in Preparing Future Managers with the Computing Skills They Need

by

Douglas Malcolm MacDormand

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A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Master of Business Administration

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *The Use of Computers by Managers, and the Role of Business Schools in Preparing Future Managers with the Computing Skills They Need* by Douglas Malcolm MacDormand in partial fulfillment of the requirements for the degree of Master of Business Administration.

Oct 4/96

Dr. Dave Jobson

Dr. Francis Lau

Dr. Donald Richards

This thesis is dedicated to Carol, Rebecca, Heidi, Wendy, and Jennifer.

ABSTRACT

The purpose of the research was to determine how managers use computers, and how business programs in universities, colleges and technical institutes prepare future managers with the computing skills they need. A survey of one hundred and ten educators in Business Administration and Commerce programs in Alberta, along with eighty-two managers of companies was undertaken during the spring and summer months of 1995 and 1996.

Results of the research indicate that both educators and managers have similar views as to what software skills and computer knowledge concepts are important. Many instructors, especially those in quantitative disciplines, integrate the use of computer into their courses. Unfortunately lack of adequate resources hinders the use of computers in many programs. While most managers are satisfied with the computing skills and concepts taught by educators, many indicated that business schools need to teach their students more practical computing skills.

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CHAPTER ONE

INTRODUCTION

Almost two decades ago, Alvin Toffler (1980) and John Naisbitt (1982) predicted the transforming of our society. According to them we have left the industrial age behind and are entering into the information age. And a key player in this information revolution was to be the computer. In recent years we have seen the realization of these predictions. In fact, the growth of computers and their usage in society has recently begun to accelerate. At last estimate, more than forty percent of homes now have personal computers (Meyer and Baber, 1995, p. 6), and with advances in the Internet, this percentage is bound to increase substantially in the next few years.

Of prime importance to this thesis though, is how computers have infiltrated the world of commerce. Seventy-two percent of the 700 government and industry executives whom attended a recent conference sponsored by the Information Technology Association of Canada believe that the most important component in Canada's international competitiveness in the next decade will the sophistication of the information superhighway's infrastructure (Kerr, 1994). But though advances in telecommunications and the Internet may be foremost in the public's mind, other significant evolutions are occurring in the realm of business computers and information systems.

Historically, computers entered the business world through the lower echelons of firms. Machine room efficiency was the primary goal of the initial business computer systems which evolved into transaction processing systems (Daft, 1992 , p .287).

The primary users of computers in business were not managers, but rather line and clerical workers. But in recent years managers have begun to engage in 'hands-on' computer usage as they realize the importance of the computer as a managerial tool. Decision support systems, executive information systems, and data access technologies such as data mining and on-line analytical processing (OLAP) all fall under the class of 'business intelligence', and a wide variety of software has recently evolved in response to this demand. A 1994 study of the Ovum consulting firm, London, estimates a growth in the business intelligence software industry of twenty-two percent per year (Krivda, 1995).

Managers from all levels of the organizations are getting into the act. As Bruce Caldwell states in his 1995 article *CEOs Click On It*:

> "If your organization's business managers don't understand IT [information technology] now, they will soon. Incentives for them to learn about computers and communications are everywhere. As PCs spread from the secretarial pool to the executive suite, all businesspeople need at least some skill with computer hardware and software."[1]

Caldwell's statement is filled with terms that need explanation. What does it mean to understand information technology?[2] Does learning about computers imply that managers will use them? What constitutes usage of computers? And what are the computing skills needed by managers? Furthermore, whereas the competencies needed and duties performed by a secretary are easily defined - encompassing a set of standard skills and computer software usage - defining the roles and functions of a manager, and

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1 Caldwell, Bruce. "CEOs Click On It." InformationWeek 8 May 1995: 28.

2 Although not synonomous terms, 'computers' and 'information technology' can generally be considered to be inseparable concepts. Thus, usage of the latter term in this paper will alway imply the existence of the former.

the way that she or he uses the computer is not an easy task. The major task of the next chapter will be to define managerial roles and how the computer is used by the manager.

Finally, defining how managers use computers is a critical question because managers must somehow learn the skills necessary to effectively use the computer. Whereas managers may learn many of their skills on-the-job, many managers are graduates of university and college business programs. Thus business schools should be aware of the computer skills needed by managers and what schools can do to help future managers acquire these skills.

1.1 RESEARCH QUESTIONS

The main research question to be answered in this thesis is twofold: *How do managers use computers, and how do business programs in universities, colleges and technical institutes prepare future managers with the computing skills they need?* Of course the above research question encompasses a wide range of topics and can be approached in many ways. Thus some initial clarification is needed.

First, managerial usage of computers can take many forms, including delegation of computing activities to subordinates. For purposes of this study, the concentration will be on actual 'hands-on' usage by managers. A taxonomy of usage will be presented in the next chapter.

Second, usage of computers implies not only a focus on software but also on physical components and their manipulation. The focus of this thesis will be on software

application types, such as electronic spreadsheet programs, word processing programs, and database management software.

Third, although a primary focus of this study is to determine computing needs of managers, determining whether those needs are met is not a mandate of this study. The reason for this will be discussed at a later time. Instead, the study will assess the importance of various computing skills and knowledge concepts as rated by both managers of companies and educators in business schools, and whether the business schools are teaching those skills and concepts.

Because the above research question is broad in its scope, a number of operational questions have been formulated. Similar questions have been grouped together; the rationale for these operational research questions will be discussed in the next section:

1.1.1 The Training of Managers in Business Schools

Q1 Do business school educators believe that they are training future managers? Do managers in companies believe that business schools are a supplier of future managers?

Q2 Do managers and educators attach the same relative importance to specific managerial skills?

- Are there significant differences in how university professors and college instructors rank these skills?
- Do educators rank these skills the same for both future managers and general business graduates?
- Are there significant differences in how managers from large companies and managers from small companies rank these skills?

1.1.2 The Importance of Computing to Managers and Educators

Q3 Do educators believe that computing skills and knowledge concepts should be taught in business schools?

Q4 Do managers and educators attach the same relative importance to future managers knowing specific computing knowledge concepts?

- Are there significant differences in how university professors and college instructors rate the importance of these knowledge concepts?
- Do educators consider these knowledge concepts to be equally important for both the general business graduate and future manager?
- Are there significant differences in how managers from large companies and managers from small companies rate these knowledge concepts?

Q5 Do managers and educators attach the same relative importance to future managers knowing how to use specific computer applications?

- Are there significant differences in how university professors and college instructors rate the importance of these applications?
- Do educators consider knowledge of these applications to be equally important for both the general business graduate and future manager?
- Are there significant differences in how managers from large companies and managers from small companies rate the importance of these applications?

1.1.3 The Use of Computers in Business Schools

Q6 How are computers used in business courses?

Q7 How do students learn application skills?

1.1.4 The Use of Computers by Managers

Q8 What are the main software applications used by managers?

Q9 For what purposes are software applications used by managers?

Q10 How do existing managers learn to use the computer?

1.1.5 Meeting the Computing Needs of Managers

Q11 Is the teaching of computing concepts and software usage in business schools deemed adequate by managers?

1.2 PURPOSE AND SCOPE OF THE RESEARCH

The purpose of this research is to conduct an exploratory study to determine the software used by managers and the purposes that it is used for. It will also determine the software applications taught in university and college business schools and how these applications are integrated into business courses. An assessment will be be made as to whether the applications used by managers are also used by business students in their courses. A comparison will also be made to determine if educators attach the same relative importance to teaching specific software applications as managers do in learning to use these applications. Similar analyses will be conducted to determine whether certain computer knowledge concepts are taught in business schools and whether educators and managers attach the same relative importance to knowing these concepts. Finally, although the question of whether business schools are teaching future managers necessary computing skills will be briefly considered, it is not the main focus of this research.

Two mailed-out survey questionnaires, one sent to managers of companies and the other sent to business instructors and professors in universities and colleges, were used to gather the data necessary to answer each of the operational research questions listed earlier. The scope of the research is limited to determining computing needs, attitudes, and uses by educators and business managers in Alberta. Specifically, only those educators teaching in business administration and commerce programs in the public universities and colleges in Alberta are surveyed. Similarly, only businesses in the Red Deer, Edmonton, and Calgary areas were surveyed, although considerable effort has been

made to assure business representation from all major industrial sectors, and from both smaller and larger companies.

1.3 LIMITATIONS

The study is limited in the following ways:

(1) The inferences and conclusions drawn from this research are not necessarily indicative of business programs outside of Alberta, nor those in private business colleges. Moreover, the survey is limited to universities and colleges with full time business students whom attend classes. Athabasca University was not included in this study.

(2) Only instructors and professors of business administration and commerce programs were surveyed. Instructors of office administration, legal assistance, computer system technologies, and similar business programs were not considered. MBA and other masters degree educators were included only insofar as they also teach undergraduate business administration and commerce students. The questions in the survey specifically focused these instructors' attention on undergraduate students only.

(3) Only businesses in the Edmonton, Red Deer, and Calgary regions were surveyed. In fact, most respondents were from the Red Deer area. Some of the larger businesses in specific sectors were surveyed in the Edmonton and Calgary areas.

(4) The results of the survey, and any inferences drawn are limited to the those respondents who completed the survey, and the population that they represent.

(5) Due to the changing nature of computers and computer usage in schools and businesses, the inferences and conclusions drawn from this study are applicable only for the 1995 and 1996 time periods, although it is likely that the results will be valuable for the years in the remainder of this century.

1.4 ASSUMPTIONS

It is assumed that respondents answered truthfully and accurately and that any inferences and conclusions drawn from this research is indicative of the responses of those in the populations studied.

1.5 GUIDE TO THE REMAINDER OF THE THESIS

The chapter that follows consists of an extensive literature review of how computers are being used by managers, how managers learn to use computers, what computer skills and knowledge concepts are taught in business schools, and whether these are the same skills and concepts required by managers. The chapter will also spend considerable time defining important terms, such as: manager, usage, and computer skills. The third chapter contains a discussion of the research methodology used in gathering data from the two populations. The fourth chapter contains a detailed descriptive and inferential statistical comparison between the findings of the survey administered to educators and the survey administered to business managers. The framework of the chapter will be the eleven operational questions listed on page 4 of this thesis. The last chapter will summarize the major findings, detail the importance of the research, and outline recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

In gathering information about the use of computers by managers, and the role that business schools play in educating future managers, a number of sources were consulted. In particular, an extensive search of several article databases was conducted, including: Educational Resources Information Center (ERIC), ABI/Inform, Computer Select, Nexus, and Dissertation Abstracts. The indices of several business, education, and computing periodicals were also perused, along with several current textbooks on the subject. Few studies were found that deal directly with the topic. That is, the manager - business school - computing connection has not been heavily researched. Some studies have focused on computing needs of businesses, some on whether schools are meeting business computing needs (not necessarily managers' needs), and some have focused on managers' computing needs (without considering the education connection), but few have considered all three together. But even with the sparsity of research in this area, the findings from several similar studies have been noted. Furthermore, much of this literature review involves the defining of important terms, without which 'use of computers by managers' becomes an ambiguous phrase.

This literature review begins with a brief discussion of how computers and information processing has evolved over the past several decades, and its importance to business. The chapter will then focus specifically on how managers use computers. Since both 'managers' and 'usage of computers' are ambiguous terms, each will be

considered in turn. An examination of specific software types and how managers use them will then follow. Finally, the chapter will conclude with a focus on the main topic of this paper - how managers are trained in software usage, and whether universities and colleges are useful in providing this training.

2.1 EVOLUTION OF INFORMATION PROCESSING

During the past few decades, considerable changes have occurred in the area of information processing. These changes have occurred in various arenas, including evolutions in hardware, software, and data and business systems, none of which are mutually exclusive.

Since the first early computers of the 1940s, computing hardware has evolved through various generations, including the first generation vacuum tube based machines (such as the ENIAC) in the late 1940s and early 1950s, and through second generation transistor based machines of the late 1950s and early 1960s. The late 1960s heralded the introduction of the integrated circuit, or computer chip. These third generation computers were thousands of times more powerful, and faster than their second generation counterparts - which were in turn thousands of times faster than the earliest computers. Then in the 1980s another leap of technology occurred with the introduction of the microprocessor - a 'computer on a chip', in which all of the main processing functions of the computer were able to be contained in a single small chip

(Kroenke and Hatch, 1993, p. 452-459). This fourth generation technology allowed the increase in popularity of the microcomputer.

The microcomputer is even replacing the large mainframe computer systems in many larger companies. In fact, microcomputers "have become so powerful that they have the same computing power as the mainframes of the 1980s, plus new graphic and interactive capabilities" (Laudon and Laudon, 1995, p. 129).

> "Microcomputers can [also] be linked in networks with other micros, printers, 'intelligent' copy machines, and telephones; this enables the micro to provide processing power to coordinate the flow of documents and work without having to rely on mainframes ... Micros can also be linked to minicomputers and mainframes, forming company-wide information networks that share hardware, software, and data resources." [3]

Moreover, microcomputers are less expensive than mainframe computers. Every million instructions per second (MIPS) run on a mainframe computer costs about one hundred times more than on a microcomputer. And storing information on a mainframe similarly costs about ten times more than if that information was stored on a microcomputer system (Laudon and Laudon, 1995, p. 131).

As hardware has evolved, a parallel evolution has taken place with software. The early machine and assembly language programs of the 1940s and 1950s soon gave way to the high level and very high level languages of the 1960s and 1970s (Kroenke and Hatch, 1993, p. 455). As software evolved, computer languages became

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[3] Laudon, Kenneth C. and Jan Price Laudon. Information Systems: A Problem-Solving Approach. 3rd ed. Fort Worth: Dryden, 1995. p. 130.

more powerful and yet easier to use. Using computers was no longer the domain of technicians and programmers; a new term - end user computing - was born:

> "... the person who benefits, directly or indirectly, from the capabilities of a computer system and uses these capabilities to perform a professional, managerial, or technical task, such as analysing a company's finances, preparing a publication-quality report, or maintaining an inventory of items of stock." (Pfaffenberger, 1990, p. 166)

In the 1970s and 1980s two important software evolutions occurred. First, purchased software became a viable alternative to the individualized custom software which most businesses used to that point. Second, object-oriented programming came into being, allowing multimedia and other sophisticated applications to be created (Sprague and McNarlin, 1993, p. 7).

Yasin and Sayers (1989) succinctly summarize the joint evolution of hardware and software during the last two decades in the following four phases: The 1970s were characterized by emphasizing programming skills using mainframe computers. The second phase of the 1980s saw the introduction of the microcomputer. During that decade, emphasis was given to the development of productivity tools such as word processing, spreadsheets, and (to a lesser extent) databases. Now in the fourth phase, computing is characterized by the use of networks as a means of sharing resources.

The phrase - networks as a means of sharing resources - gives us a clue as to how computers have changed the way businesses function. Through the ability to network and share resources all members of an organization can potentially participate in the use of computers, the processing of information, and the making of decisions. Traditionally we have seen this manifested in a downward shift of decision making power in organizations. But an equally important shift is also occurring: information processing power, and

computer usage is moving upwards into management levels. Richard Daft summarizes these changes well: Initial computerized systems in organizations were initially "based on the notion of machine room efficiency", with its goal of reducing labour costs by having the computer take over certain tasks (Daft, 1992 p. 287). This lead to the creation of transaction processing systems, which automated routine day-to-day business transactions such as sending bills to customers and placing orders. Managers typically had little hands-on experience with computers as these tasks were done by clerical and line staff. Thus computer usage in many companies entered through the lower echelons. But in the next phase managers began to see the value of using computerized information systems to help them make better decisions. Managers began to see the value of extracting useful information from the huge amounts of data gathered by the transaction processing systems. Management information systems, with their focus on collecting, organizing, and summarizing information for managers, became the business rage. Gradually, decision support systems, executive information systems, and other terms with equally impressive monikers, evolved allowing managers at all levels of the organization to analysis, organize, and present information necessary for decision making in the upper echelons of the organization (Daft, 1992, p. 288).

But while transaction processing systems have been in use for several decades in many organizations, computer usage by managers is fairly new in our history - hence the focus of this thesis.

2.2 THE IMPORTANCE OF COMPUTERS TO BUSINESSES

In the above section it was stated that people in all levels of the organization are using computers. But it hasn't been determined why businesses are using computers. In fact, the widespread use of computers in business is largely in response to competitive pressure. Porter outlines five competitive threats in business and how information technology both causes the threat and conversely helps to deal with these threats (Porter, 1990, p. 35). For instance, automated teller machines are breaking down the threat of new entrants - Porter's first competitive force - in the banking industry. Porter's second competitive threat - the threat of substitute product or services is manifested in the increasing use of e-mail as a substitute for paper mail. The bargaining power of buyers is increasing significantly as buyers have better access to information and product availability through Internet services. Companies are countering this threat by using computers to help them design better products, and using telecommunications systems to help them keep in touch with their customers better. A manifestation of the fourth competitive threat - the bargaining power of suppliers - is found in suppliers of funds to financial institutions who are able to monitor the economy better and move their funds easily. Finally, the fifth force - the rivalry amongst competitors - has forced the use of computers and information technology in many industries. Airlines companies, through their frequent flyer programs, and telephone companies, with their expanding customer services, can only operate well if customer information is easily and quickly accessible.

Porter states three generic strategies that firms can adopt to counter these competitive forces, all of which can be realized in part by the use of information

technology. Low cost leadership can be established through using the computer to achieve greater operational efficiency. Computers can be used to automate processes, and assist in work flow redesign (Daft, 1992, p. 293). Differentiation - Porter's second strategy - can be achieved by locking in customers with information technology. For instance, by allowing customers to place orders directly through EDI (electronic digital interchange) systems, service differentiation can be achieved (Daft, 1992, p. 294). Finally, finding a market niche, either through a specialized product line or geographical market, is more easily achieved with the help of information technology. With the growing capabilities of companies to gather information about customer demographics, competitors, and economic factors, companies can more easily produce products and services geared towards a particular group or niche. (Sprague and McNarlin, 1993, p.80). In fact, in the late 1970s and early 1980s most businesses relied on secondary and limited primary data to assist them in business decision making. But now with advances in information technology, almost any business can gather its own primary data (James, 1987).

Thus, competitive advantage and survival has become the driving force behind the infiltration of information technology in business. Achieving competitive advantage is the primary motivator behind the booming business intelligence market (Krivda, 1995). Industries are changing too, causing new demands in the realm of information technology.

> "Less than one in five individuals is currently employed in manufacturing, and this proportion continues to shrink. On the other hand, the service sector is growing phenomenally. Its growth is partly dependent on the infusing of information technology, which has enabled many of these firms to deal with explosive information processing requirements." [4]

According to Michael Hammer (1990) the watchwords for the 1990s will be innovation and speed, service and quality. The radical shift away from a manufacturing based economy to a service based economy will result in a restructuring of the way businesses operate. Peter Keen's prognostications for the 1990s include: (1) every large firm in every industry will have from twenty-five to eighty percent of its cash flow processed on-line, (2) electronic data interchange will be the norm, (3) point-of-sale and electronic payments will be core services, (4) image technology will be an operational necessity, (5) work will be distributed, and reorganization will be common place, (6) work will increasingly be location independent, and (7) reorganizations will be frequent, not exceptional (Keen, 1991). "As the technology effects even more aspects of the business, work itself will change and require a different set of skills. People will need to be technically sophisticated and better educated in order to cope with the demands on them." (Applegate et al., 1988). Therefore, businesses will need to reorganize and change not only the way they do business technologically, but also change the structure of the organization themselves. The key word is flexibility. Companies will seek more flexible ways of organizing. The traditional hierarchical structure of management will be replaced

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[4] Pennings, J. M. and Farid Harianto. "The Diffusion of Technological Innovation in the Commercial Banking Industry." Strategic Management Journal 13 (1992):29.

with dynamic networks. Computer supported group problem-solving tools, or group decision support systems will be used to facilitate the team work (Desanctis et al., 1991).

But as companies become more flexible, managers will need to develop better ways of handling the change and uncertainty. The need for computer usage by managers will be discussed in the next section.

2.3 THE IMPORTANCE OF COMPUTERS TO MANAGERS

2.3.1 Defining Manager

With the emergence of more flexible and decentralized organizations, deciding whom in an organization to refer to as a manager is no longer an easy task. Managers now are known by various monikers, including: boss, manager, supervisor, director, team leader, officer, coordinator, and numerous others. Managers have traditionally been defined as being those persons involved in one or more of four functional roles in an organization: planning, which involves the defining of businesss goals and describing how they will be fulfilled; organizing, involving the assigning of resources and responsibilities for accomplishing goals; leading, concerned with motivating employees; controlling, involving the monitoring of the activities of the business, and making necessary corrections (Laudon and Laudon, 1995, p. 588). However the traditional

definition of manager has had to be expanded in recent years. As Harold J. Leavitt and Thomas L. Whisler predicted in 1958:

> " ... by the late 1980s the combination of management science and information technology would cause middle-management ranks to shrink, top management-to take on more of the creative function, and large organizations to centralize again. Those middle-management positions that remained would be more technical and specialized. New mid-level positions with titles like 'analyst' would be created." [5]

For purposes of this thesis, 'business professionals', such as certified accountants, will also be considered as part of the managerial group. The rationale for this is that business professionals are often involved in one or more of the four managements functions.

Mintzberg (1971) helps to further define 'manager' by listing ten roles that managers perform, adapted by Laudon and Laudon (1995, p. 589), and shown on the next page. Furthermore, managers are often classified according to their level in the organization. Each level of management - senior, middle, and lower - is defined in part by the types of task performed. Senior management is particularly concerned with strategic planning, which deals with broad issues concerning the organization's development over the long term. Middle management's tasks are more centred around tactical planning and control, involving how resources are to be allocated within departments, scheduling and forecasting, and budgeting. Lower level managers are typically involved with operational planning and control, involving decisions made in the normal day-to-day operations within a business or department (Curtis, 1995 p. 9).

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[5] Applegate, Lynda M., et al. "Information Techology and Tomorrow's Manager." Harvard Business Review Nov.-Dec. 1988: 128.

Table 1 - Management Roles

Category	Role	Activity
Interpersonal	Figurehead	Perform ceremonial and symbolic duties such as greeting visitors or signing legal documents
	Leader	Direct and motivate subordinates; train, counsel, and communicate with subordinates
	Liaison	Maintain information links both inside and outside the organization; use mail, phone calls, and meetings
Informational	Monitor	Seek and receive information, scan periodicals and reports, and maintain personal contacts
	Disseminator	Forward information to other organization members; send memos and reports, and make phone calls
	Spokesperson	Transmit information to outsiders through speeches, reports, and memos
Decisional	Entrepreneur	Initiate improvement projects; identify new ideas and delegate idea responsibility to others
	Disturbance Handler	Take corrective action during disputes or crises; resolve conflicts among subordinates; adapt to environmental crises
	Resource Allocator	Decide who gets resources; scheduling, budgeting, and setting priorities
	Negotiator	Represent department during negotiation of union contracts, sales, purchase, and budgets; represent departmental interests

2.3.2 The Prevalence of Computer Usage by Managers

Both Mintzberg's list of managerial roles, and Curtis' list of managerial levels and tasks emphasize the need for information and decision making ability. Recall also, as discussed on page 15, that the ability to acquire and process information well is essential to handling the competitive forces facing a business. The specific business information systems used to help the manager acquire and process information, and make decisions will be discussed in a later section.

Indeed, the interest in and use of computers by managers is becoming more and more widespread. Nearly half of the 150 business executives surveyed in 1995 by Information Week want more control and authority over their organizations' information technology planning and development (Caldwell, 1995). A study of sixty-seven managers found that eleven of twenty senior managers, twenty of thirty-six middle managers, and three of eleven lower managers used microcomputers (Benson, 1983). Lee (1986) found that the middle managers he surveyed averaged 7.94 hours of computer usage per week. Line supervisors (lower managers) averaged 6.83 hours per week, and executives average 4.39 hours per week. A study of managers, with ten to twelve years work experience, enrolled in Houston Baptist University's Executive MBA program gave an average rating of 3.1 on a five point likert scale (5=strongly agree), on the statement "Microcomputer applications are central to my job performance" (Franklin, 1990). In his doctoral dissertation, Suber (1991) found that ninety-three percent of the 752 managers of Westinghouse Electric, Corp. who responded to his survey stated that they spent one hour or more each day using personal computers. The average computer usage was approximately two hours per day (p. 65). In his doctoral dissertation, Larsen (1989) found that fifty-five of the ninety-nine managers whom responded to his survey claimed to average 3.3 hours per week of active 'hands-on' computer use (p. 115).

2.3.3 Defining Computer Usage

A problem with many of the studies referred to above is that they often do not define what computer usage means. For example, perusing computer output generated by a subordinate, or asking a subordinate to produce an invoice form using a word processor

may satisfy some managers that they use a computer. Another issue closely tied to that of usage is whether a manager is computer literate, which encompasses not just the physical manipulation of a keyboard, but also a basic understanding of computer processes and their social and economic impact. Lifer (1992) cites Watt in an attempt to define computer literacy:

> "Watt (1982) divides computer literacy into the areas of: (1) the ability to control and program computers, (2) the ability to use a variety of pre-programmed computer applications, (3) the ability to use a computer for information retrieval, communication, and problem-solving, and (4) the ability to understand the economic, social, and psychological impact of computers on the individual and our society." [6]

The National Business Education Association, defining computer literacy from a business perspective, adds that computer literacy includes a "[recognition of] how computers may be used as management tools" (NBEA, 1984).

The problem with Watt's definition above is that it still does not define the word 'use' in points one and two. But Larsen (1989) lists four aspects of managerial use of computers: "(1) hardware available to the user, (2) hands-on use of computers, (3) delegation of computer tasks, and (4) use of support functions". For purposes of this study only category two will be considered when referring to managerial usage of computers. Categories three and four signify only that the manager makes use of computers through subordinates or computer support personnel but does not directly

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[6] Lifer, J. David. A Comparison of the Computer Skills Needed by Business Adminstration Graduages as Perceived by Personnel Directors in Ohio and Current Skills Being Taught in Ohio Colleges and Universities. Diss. Ohio State University, 1992. p.17.

interact with the computer. Category one only signifies that the equipment is available, but in no way implies that the equipment is actually used by the manager. Category two - hands-on use of computers - involves four levels of complexity: "(1) use of operational systems, (2) report generation, (3) inquiry/simple analysis, and (4) complex analysis" (Larsen, 1989 p. 16; Rockart and Flannery, 1983).

This study will consider the different levels of complexity involved in hands-on computer use by managers, as well as some of the other knowledge components of computer literacy.

2.4 HOW MANAGERS USE COMPUTERS

Having defined computer usage, and having determined that many managers are using computers, the next step is to specify how managers are using computers. This is best done in the context of describing five business information systems.

2.4.1 Business Information Systems

As previously discussed on page 1, Daft describes the historical bottom up infiltration of computers into businesses, first through transaction processing systems, and then through management information systems (MIS) - a mechanism which "collects, organizes, and distributes data to managers for use in performing their management functions" (Daft, 1992, p. 287-288). But Kroenke and Hatch state that a MIS is not limited to management kinds of applications, but in fact refers to "the development and

use of effective information systems in organizations" (1993, p. 400). They further state that a MIS, actually comprises five business information systems:

Transaction processing systems (TPSs) are the basic accounting and record-keeping systems. It is through the TPSs that most of the raw data used in other information systems enters the company. Lower level managers typically engage in little hands-on usage of the TPS - this function is normally performed by the clerical staff - but lower level managers, concerned with operational planning and control, must be knowledgeable of how the system functions. That is, the TPS deals with the day to day operations designed to ensure the effective and efficient use of existing resources to realize budget objectives (Curtis, 1995, p. 10).

Management reporting systems (MRSs) produce reports to support business management (Kroenke and Hatch, 1993, p. 404). Not as concerned with day to day operations, MRSs are instead interested in period reporting which allows "the monitoring of actual production and expenditure against budgets, the analysis of variances and actions taken in response". Thus, MRSs are most often used by middle managers who are interested in tactical planning and control functions in an organization (Curtis, 1995, p. 9). Returning to Mintzberg's list of managerial roles on page 20 of this thesis, Laudon and Laudon claim that MRSs are useful in assisting the manager in performing both informational and decisional roles (1995, p. 593). In particular, MRSs facilitate the manager's role of monitoring, which is concerned with seeking and receiving information, scanning periodicals and reports, and maintaining personal contacts. MRSs are also helpful in the manager's disturbance handling decisional role, which is concerned in part, with adapting to crises. (Please note that many authors,

including Laudon and Laudon, refer to MRSs by their more traditional name - MISs. But in keeping with Kroenke and Hatch's taxonomy of business information systems, in this thesis MIS refers to the collection of all five business systems.)

Decision support systems (DSSs) are interactive (on-line), computer-based facilities for assisting human decision making (Kroenke and Hatch, 1993, p. 409). Less structured than TPSs or MRSs, DSSs are neither formalized, nor closed systems, and can easily be adapted to any number of different situations. Curtis lists three types of DSSs:

(1) Data retrieval and analysis systems for decision support, which include simple entry and enquiry systems (i.e. database management facilities), data analysis systems (such as statistical software), and accounting information systems.

(2) Computational support for structured decisions, which involve "using existing general data held on a database and computation together with details of individuals cases to arrive at information for a decision". For example, a motor insurance quotation system, looks up data on an individual, computes a set of calculated premiums, and optimizes a decision based on some group of variables such as low cost, maximum protected bonus or minimum excess.

(3) Decision support involving modelling, including spreadsheet, probabilistic, and optimization models. [7]

DSSs were first used by the analysts that created them, using the systems to explore collected data, build models of predicted financial or sales performance, and look for patterns and associations in data (Weldon, 1996). But as DSS software evolved, the easier to use applications began to be utilized by managers. DSSs are particularly useful in helping the manager in his or her decisional role as resource allocator

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[7] Curtis, Graham. Business Information Systems: Analysis Design and Practice. 2nd ed. Wokingham: Addison-Wesley, 1995. p. 158

(Laudon and Laudon, 1995, p. 593), as outlined in Mintzberg's list on page 20 of this thesis. Moreover, DSSs are best suited for middle managers who are most concerned with tactical planning and control. However, the use of DSSs among senior managers is beginning to increase (McKague, p. 9). "Senior executives typically use their PCS as an information tool to receive facts and figures from corporate databases, whereas newer MBAs routinely use them as analysis tools for performing financial tasks. As the junior executives move up the corporate ladder, greater use of PCS will become 'just a normal part of one's professional skills'" (Leeke, 1987).

Executive information systems (EISs) are "computerized systems that provide executives with easy access to internal and external information that is relevant to their critical success factors" (DataPro, 1993), and hence are used by senior managers to help them with strategic planning (Curtis, 1995, p. 9). (EISs are also known as executive support systems (ESSs) and enterprise information systems (Rook, 1996), presumably so as not to limit their usage to executives.) EISs present information in a highly summarized form, usually using reports in standard format, and very often accompanied by graphics and other multimedia effects. They typically use information generated from TPSs and DSSs (Kroenke and Hatch, 1993, p. 416).

Communication support systems (CSSs) are not the exclusive domain of managers, but are used by all workers to facilitate communication throughout the organization. CSSs are not a single system, but rather include a number of distinct functions, including: word processing, graphics, desktop publishing, e-mail, electronic conferencing, and electronic bulletin boards (Kroenke and Hatch, 1993, p. 415). Laudon and Laudon present CSSs as helping the manager in his or her interpersonal role as a

liaison between groups both within and outside the organization, and in informational roles as a disseminator of information, and as a spokesperson. (See Mintzberg's table on page 20.)

2.4.2 Using Business Information Systems as a Framework

A focus on the five business information systems typically found in companies is useful for determining the scope of computer usage by managers. However, questionnaires sent to managers typically do not use these terms, but rather focus on software used. This is done for three reasons:

(1) There is not a clear delineation between many of the systems. For instance, the output from DSSs are often used in EISs (Kroenke and Hatch, 1993, p. 416). And as senior executives become more computer literate - especially as young MBAs climb the corporate ladder (Leeke, 1987) and start using both DSSs and EISs - the differences between the two systems become less obvious.

(2) Many managers are unfamiliar with terms such as decision support system and executive information system, especially in smaller companies where several roles may be filled by one person. However, managers are more likely to think of computer systems in terms of software, as there is a clearer delineation between a spreadsheet application and a database application than between two business information systems.

(3) A particular system - such as a decision support system - may encompass many different types of software, including spreadsheet, database, statistical, and accounting applications, among others. Also, many software applications can be used by more than one system. For example, spreadsheets may be used by TPSs, MRSs, and DSSs. Again, managers are more likely to think in terms of software usage rather than business systems.

Therefore, the focus of most research has been on specific software used, although the better studies also try to determine what the software is used for. This will be discussed in the next section.

2.4.3 Software Used by Managers

In smaller companies, managers may need nothing more than an integrated application package such as Microsoft's or Corel's Office Suite. But hundreds of software applications may be used in larger companies. Table 2 on page 30 shows the numerous information sub-systems, classified both by division and level of management, which may be existent in a large company. (Schultheis and Sumner, 1995) There exists specific software for each of these sub-systems.

> "Wherever there is a mobile sales force in need of an up-to-the-minute quote, there is an application. Wherever a customer needs to track a package, stock price or invoice, there is an application. Wherever a supplier or analyst needs to invoke the searching capabilities that are inherent to databases, there is an application." [8]

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[8] Marshall, Martin. "Databases and the Internet (Part Four)." Communications Week 11 Mar. 1996: 1.

But many of these applications have limited use in areas other than those they are specifically designed for. For instance, creativity booster software, uses a combination of question and answer strategies with idea-sparking text boxes to help marketing managers develop new ideas (Seideman, 1995); however the use of creativity boosters in the accounting division is probably limited at best.

But although there are a great number of specialized software applications on the market, there are also the common applications which are used by most. "All knowledge workers need proficiency in the fundamental tools of personal computering (sic), such as e-mail, spreadsheets, word processing, databases, presentation graphics, statistical analysis, and external database retrieval." (Glass, 1992) And these basic tools may adequately perform the functions of much specialized software. For instance, inventory, point of sale, ordering/receiving, customer records, electronic catalogs, and purchase order processes can all be handled in many companies with good database software. Sales projections, financial ratios, cost estimates, budgeting, pricing, market trend analysis, sales projections, stock turnover, and statistical analysis procedures can be handled by spreadsheet applications. Report writing, business reports, direct marketing, form letters, and sales order preparation can be handled with good word processing software (James, 1987).

Table 2 - Divisional Activities and Information Systems

	Strategic Planning	Tactical	Operational
Accounting and Financial Information Systems	Financial condition analysis Long-range forecasting	Budgeting Cash management Capital budgeting Investment management	General ledger Fixed asset Sales order processing Accounts receivable Accounts payable Inventory control Purchase order processing Payroll
Marketing Information Systems	Sales forecasting Product planning and development	Sales management Product pricing Advertising and promotion	Prospect information Contact information Inquiry information Document information Telemarketing Direct mail Distribution channel
Manufacturing and Production Information Systems	Site planning and selection Technology planning and assessment Processing positioning Plant design	Materials requirements planning Just-in-time processes Capacity planning Production scheduling Production design and development	Purchasing Receiving Quality control Shipping Cost accounting Inventory management and control
Human Resource Information Systems	Workforce planning Labour negotiations	Job analysis and design Recruiting Compensation and benefits Employee training and development	Employee Position control Applicant selection and placement Performance management Government reporting Payroll

A 1994 survey of eighty-three Fortune 500 companies in south central United States found word processing, spreadsheet, database, electronic messaging/calendaring, and business accounting to be the top five computer tasks routinely performed within organizations (Ellis, 1994, p. 74). And specifically focusing on managerial usage, Larsen (1989) found that fifty-five percent of middle managers were active hands-on users of word processing software, forty-three percent used spreadsheet software, and fourteen

percent used database software. Other software (with percentages) frequently used by middle managers included presentation graphics - thirty percent, flowchart and diagram graphics - seventeen percent, project scheduling - eight percent, and electronic messaging - only two percent in 1989 (p. 115). Suber's study (1991) considered three levels of management, and found that seventy-three percent of the 512 managers who responded to the survey used word processing software, averaging 3.8 hours per week; sixty-seven percent used electronic spreadsheets, averaging 2.9 hours per week; and seventeen percent of managers using database management software, averaging 1.1 hours per week. Other commonly used software applications included graphics, project management, and communication software (p. 99). Only with project management and communication software were there found to be significantly different levels of usage, depending on the level of management. In both instances senior managers were found to have higher average usage times than did middle or lower managers. It is important to note that in the Suber study the researcher did not define computer usage, and might have been interpreted by some managers as also meaning delegation of computer tasks to subordinates. Larsen, however, clearly measured actual hands-on usage of computers.

Two other studies focused on the use of spreadsheet programs in companies. A 1991 survey of 200 1991 Bachelor of Commerce graduates found that thirty-two percent frequently (more than once per month) used spreadsheets in their jobs. Sixty-one percent of 1988 graduates frequently used spreadsheets (Brooks, 1991). A survey of 215 MIS managers by Lomo-David (1988) found that ninety-three percent used spreadsheet applications for accounting purposes, eighty-nine percent for budgeting and monitoring,

seventy-eight percent for forecasting and graphics, seventy-eight percent for internal reports, and sixty-five percent for decision making.

2.4.4 Telecommunications Software

Of particular interest during the past few years is the fast growth in telecommunications software and Internet services. Recent advances in telecommunications include, among others: the emergence of global network services, the focus of network designers on interconnecting local area networks (LANs), and the use of electronic mail (e-mail) as a new communication structure (Sprague and McNarlin, 1993, p. 174). Electronic data interchange (EDI) - a method of doing business and carrying out transactions electronically - is fast becoming a standard in many industries, and has the potential to effect all business operations (Kerr, 1994). An estimated five to twenty percent improvement in the productivity of management and professional staff can be expected when e-mail is used (Flately, 1992).

Business interest in the Internet is considerable. A 'network of networks' (Resnick and Taylor, 1994, p. xxi), the Internet connects over 100,000 computer networks with over 50,000,000 users world-wide. Commercial networks are the fastest-growing of the Internet subnets (Birkhead, 1994). Companies are also beginning to integrate Internet services with other software applications. John Rymer, vice president of the Giga Information Group Inc., Cambridge, Massachusetts states: "The Internet is the appropriate medium for spreading access to corporate data. The companies that we talk to see the Web as a low-cost point of access." (Marshall, 1996) "Database connections to the Web can be used either to create totally new applications and services, or to extend existing

enterprise applications in an inexpensive, user-friendly, platform independent fashion." (Marshall, 1996) Platform independence is a major advantage of using the Internet. That is, applications running on the world-wide-web - a major feature of the Internet - all use some form of HTML (hypertext markup language). Thus, any application written in HTML can be accessed through any computer that uses a generic web-browser (White, 1995).

Unfortunately, no recent studies were found that considered the use of the Internet in companies. Moreover, due to the rapid changes that are currently occurring in this area, studies of even one to two years old are likely to be out-of-date.

2.4.5 High Powered Business Intelligence Software

Although the software applications discussed in the previous section are used by most companies, high powered business intelligence software has evolved during the last few years for two reasons: First, the drive for companies to achieve a competitive advantage by securing a niche in the market (discussed on page 16 of this thesis) demands that these companies know a great deal about their market and customers (Bachteal, 1996). Second, the storage and analysis of the huge amounts of data needed about markets and customers demands software more sophisticated than standard database and spreadsheet applications. "The quantity of data now stored in computer systems is rapidly reaching unmanageable proportions ... It is calculated that by the year 2000 more than 750 petabytes (750 billion megabytes) will be online." (Enticknap, 1995)

In response to this need, sophisticated software and processes such as neural computing, data warehousing, data mining, and OLAP tools have recently come to the

forefront. Enticknap maintains that neural computing - based on the concept of neural networks, a large number of simple processing units interconnected in a complex structure that models the human brain - is being used by banks and insurance companies in an attempt to better target customers and eliminate fraud.

Data warehousing is the practice of consolidating and organizing large amounts of data gathered by a company (Martin, 1995). "It is not a dump of all company data into one place. It is a highly architected environment containing a lot of data." (Henderson, 1995) In particular, it is characterized by three technical components: data extraction and movement methods, connectivity software for client-server integration, and a high-performance relational database management system (Brown, 1995). More than ninety-five percent of 250 companies surveyed by the Meta Group in 1995 said they plan to build a data warehouse - up from only fifteen percent a year earlier. (DePompa, 1996)

On-line analytical processing (OLAP), a term coined by Dr. E. F. Codd in 1993 (Greenfield, 1996), and data-mining are two terms which are often used interchangeably, and in turn are often confused with DSS and EIS:

> "Other related terms have been coined more recently: On-Line Analytical Processing (OLAP), a term for the way data is (sic) formatted and stored, the technology on top of which analytical applications run; data warehousing, the repository for data used by OLAP tools; and data mining, the capability to bring data from various sources into the repository. None of these new terms describes or has anything necessarily to do with the way data is (sic) eventually presented to a user, whether the user is an executive or not. They describe the technology that underlies the business data analysis applications, like EIS or DSS. The term EIS is still used - executives still need to be briefed - but it has become a product subset, a function in a larger software environment."[9]

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[9] Dickey, Sam. "When Worlds Blend." MIDRANGE Systems 13 Oct. 1995: 20.

Nevertheless, OLAP is the term commonly used in literature to refer to not only the technology, but the software as well. The 1994 OLAP Report estimated the OLAP software market was worth $330 million in 1994 and was expected to grow by over forty percent in 1995. OLAP applications have the advantage of integrating the organizational features of a database program and the analytical capabilities of a spreadsheet. A "spreadsheet on steroids" (Eckerson, 1996), an OLAP application is characterized by the following features: (1) access to multiple databases, (2) the ability to perform complex modelling, and (3) sophisticated drill-through (often called data mining) techniques, allowing the application to sort through huge amounts of data to retrieve pertinent information (Bulos, 1995). And by using HTML, OLAP applications can be connected to the Internet, allowing complex analysis of remote data (Phillips, 1996).

As with Internet applications, there has been a lack of research into the use of high powered business intelligence software in companies. This is likely due to two reasons: First, like Internet applications, OLAP and similar applications are relatively new. Second, due to their high cost, they are almost exclusively the domain of larger companies. Typical OLAP applications such as Oracle (the most widely known) and BaseSAS can run into thousands of dollars per year. For instance, a one-year licence to use BaseSAS - a program widely used by Fortune 500 companies - costs $2,000 per client, plus $25,000 for the server (Conner, 1996). Moreover, they are difficult to master (Bort, 1995).

Fortunately for the smaller businesses, increases in computer processing power should help to close the gap between the high powered applications and the more common inexpensive applications. For instance, as they evolve, spreadsheet programs

such as Microsoft Excel are gaining proficiency in performing high power functions. Excel now has high powered query tools allowing it to perform multidimensional data analysis, previously the domain of OLAP packages (Frank, 1995). Moreover, it can be integrated with other applications, such as Timeline's MetaView Analyst, allowing it to analyse and perform complex drill down functions (Jones, 1996).

2.5 TRAINING PRESENT AND FUTURE MANAGERS

Having determined that many managers engage in hands-on use of computers, and having determined which applications are used by managers, the next step is to ascertain how managers learn to use computers, and finally the role that universities and colleges play in training managers in the computing skills they need.

2.5.1 The Training of Present Managers

A study by Wentling (1988) revealed that eighty-four percent of 500 businesses surveyed in Illinois provided some form of in-house computer training. Seventy-three percent also used vendor supplied training. On-the-job training was the most frequent response for type of in-house training, followed by self-study at fifty-two percent. All businesses indicated a needed for computer training. The greatest training needs were in the areas of: word processing, spreadsheets, database management, financial planning, and selection of computer equipment. The majority of the companies surveyed were small, sixty-eight percent with twenty-five or fewer employees.

A study by Egmund (1987) found that of 177 businesses surveyed in Oklahoma, sixty-five percent provided some form of training for their employees. Seventy-two percent of the companies used outside vendors as the major source of training. Office supervisors was the group receiving the most training, followed closely by secretaries and top managers.

Of the eighty-five south-central U.S. Fortune 500 companies responding to a survey by Ellis (1994), ninety-three percent indicated that computer training was provided within the organization. Of these companies, ninety-four percent indicated that classroom instruction - lecture, demonstration, hands-on, etcetera - was used as an instructional method. Sixty-three percent indicated one-to-one instruction as a method of training, computer-based instruction - fifty-nine percent, video-based instruction - forty-four percent, and tutorials was indicated as a method of instruction by four percent of these companies. Fifteen percent of training was provided by educational institutes. When shown a list of seventeen computer topics, ninety-seven percent of companies, who offered some form of computer training, offered training in spreadsheet usage. Ninety-five percent offered training in using a word processor, eighty-seven percent - database, seventy-six percent - operating systems, seventy-four percent - introduction to personal computers, sixty-four percent - graphics, fifty-eight percent - computer systems / local area networks, fifty-seven percent - electronic messaging / calendaring, and fifty percent offered training in desktop publishing. When asked to choose from the same list of seventeen computer topics, respondents ranked word processing (at seventy-nine percent) as being the area where the training need was the greatest, followed by spreadsheets (seventy-eight percent), and operating systems (seventy- three percent). Respondents

ranked spreadsheet, word processing, and database skills as being the most important needs for training in the next five years.

2.5.2 The Demand for Business Schools to Train Future Managers

Although most of the companies surveyed in the above studies do supply some form of computer training for managers, there is the expectation, in at least some companies, that newly hired managers and future managers (those on a managerial track) already be familiar with computers. "Until about 1983, MBA students who enrolled in computer classes primarily learned basic programming. But since the proliferation of business PCs, they have concentrated much more on software applications, especially popular spreadsheet, database manager and word-processing packages." (Leeke, 1987) Widmeyer and Baber, claim that "the software is the more important factor" (Leeke, 1987). While the above quote refers to MBA graduates, similar demands are made on graduates of university and college business programs. A survey of human resource directors in five major business segments - banking, insurance, utilities, retail, and manufacturing - reveal that the top five computer competencies requested of business college graduates are: general microcomputer skills, spreadsheet, database, statistical, and word processing skills (Blanton, vol. 33.2).

2.5.3 The Effectiveness of Business School Training of Managers

Three possible approaches can be taken to determine effectiveness in training. First, the Economic Council of Canada's proposed indicators of education targets include: "supplies of highly qualified personnel show how well the education system responds to the skill needs of the information economy" (Canada Communications Group, 1992). But whereas measuring qualifications in some jobs is a fairly easy task, it is not an easy task for others. For example, secretarial sciences and automotive programs teach their students a basic set of skills needed by most future secretaries and mechanics. Many of the graduates of these programs will enter the work force as secretaries or mechanics soon after graduation. Moreover, it will soon become obvious whether the secretary or mechanic can perform the required tasks adequately. However, measuring the qualifications of a manager and whether he or she was successfully trained by a business school is not an easy task for several reasons:

(1) Although many managers acquire a business degree or diploma, many do not, especially those in smaller companies.

(2) Although business schools are aware of their mandate to train future managers, business schools typically try to supply their graduates with the skills they need to function in the business world, but not necessarily as managers. That is, there are many positions in businesses which are not managerial positions.

(3) Most graduates of business schools are not likely to join companies at the management level. While many companies might hire graduates with the

intention of these initiates eventually becoming managers, most recruits will be required to take on a subordinate role before the greater authority of a manager is bestowed upon them. Thus, because of this time lag, it is difficult to determine whether certain learned skills were the result of business school training, or on-the-job training. Similarly, skills may be lost if the time lag between graduation from a business school and work as a manager is too large. This is especially true in the area of computing, with its rapid yearly changes.

(4) Unlike the skills required by secretaries and mechanics, the skills needed to be effective manager are neither clearly defined nor easily measured. For instance, evaluating a manager's innovativeness, creativity, or interpersonal skills is more difficult than determining if a secretary can type a certain number of works per minute or a mechanic can successfully install an alternator in a certain period of time.

(5) Effectiveness cannot be measured if managers do not use computers, and lack of use does not necessarily imply lack of sufficient training.

Concerning the fifth point, interviews of workers reveal several reasons why workers do not use computers, most of which have little or nothing to do with competence, including: problems with functionality - the computer does not offer the worker what he or she needs; accessibility / availability - the computer is shared with others, and the worker often must wait; start-stop hassles - especially dialling numbers to

connect; system dynamics and response time - the system is too slow; work-session interruptions - the system frequently crashes; command languages - need to be letter perfect, unnatural, etcetera (Suber, 1991).

As a result of the five difficulties mentioned above, there have been few known studies done in recent years that measure managerial qualifications and effectiveness in the area of computing. One way that some researchers have attempted to assess the effectiveness of business school training is to survey students who are enrolled in a business school program and working as managers at the same time. Managers, with ten to twelve years work experience, enrolled in Houston Baptist University's Executive MBA program gave average ratings of 3.9 and 3.7 respectively on a five point likert scale (5=strongly agree), on the statements "I feel my personal productivity has increased as a result of using the computer in the master's program" and "I feel I have become a more productive (and competitive) employee as a result of using the microcomputer in the master's program" (Franklin, 1990). While the findings of this study are useful, other methods should also be employed to determine the effectiveness of business schools in training future managers. Moreover, while surveying students enrolled in an executive MBA program may circumvent the time lag mentioned in point three on page 39, most business schools do not have the luxury of having a significant portion of their students currently being employed as managers.

A second approach that some researchers have taken is not one of measuring effectiveness (due to the problems stated above) but rather measuring concordance between the computer skills and concepts are taught in business schools and those required by businesses. Lomo-David's (1988) survey of 215 MIS managers and MIS

instructors at 115 colleges investigated how spreadsheets were being used in companies and schools. Ninety-three percent of companies use spreadsheet for accounting functions, eighty-nine percent use them for budgeting and monitoring purposes, seventy-eighty percent for forecasting / graphics, seventy-eight percent for internal reports, and sixty-five percent for decision making. Of the colleges: fifty-four percent use spreadsheets for decision making purposes in their class, fifty-four percent for forecasting / graphics, fifty-two percent for budgeting and monitoring, fifty percent for accounting, and forty-seven percent for summing and averages calculations. A possible flaw with Lomo-David's study is that his questionnaire does not distinguish between instructors who use the computer for pedagogical reasons and those who use it for computer productivity reasons. That is, some instructors use computers as a teaching aid, rather than teaching the students to use the computer. For instance, statistical instructors may have students analyse computer output produced by a statistical software or spreadsheet package, but may not require the students to produce their own output.

A third method used by some researchers does not involve measuring the actual use of computers in businesses or courses, but rather determines if there is agreement between businesses and colleges as to the importance of the certain skills or concepts. In his study Lifer (1992) used a series of likert scales to assess the attitude of instructors and managers toward computer usage. Forty-nine chairpersons of business administration college programs were surveyed as well as the personnel managers from thirty Fortune 500 companies headquartered in Ohio. From a list of nineteen computer skills and concepts the ones rated highest (with a mean rating of four or more on a five point likert scale) by college instructors were: understanding electronic spreadsheet applications,

interacting with software, making decisions necessary to solve problems, understanding word processing features, understanding the role of the computer in solving problems, proficiency with DOS, and understanding business changes caused by technology. The highest rated items according to personnel managers were: making decisions necessary to solve problems, understanding electronic spreadsheet applications, understanding word processing features, interacting with software, proficiency with DOS, understanding the role of the computer in solving problems, and keyboarding proficiency. Thus, six of the top seven skills deemed most important to instructors were also on the managers' top seven list. Lifer used comparative t-tests to see if there were any significant differences between how instructors and managers rated the items. Significant differences, at a five percent level, existed for only four of the items. Instructors rated two skills: understanding business changes caused by technology and understanding electronic spreadsheet applications as being more important than did managers, even though spreadsheet skills were listed in both group's top seven rated skills. Managers rated two skills: students will develop an introductory background in programming concepts, and students will develop and understanding of the program cycle as being significantly more important than did instructors, even though neither of these skills were in the managers' top seven list. (Please note that Lifer's inferences used statistical tests that require interval scale data, however Lifer's data are ordinal in nature.)

2.6 SUMMARY

During the past five decades we have entered the information age and computers have played a significant role in how society has changed. Competitive pressures in many industries have significantly increased as we have shifted towards a service based economy, and the role of information has significantly changed the way many companies do business. In fact, the use of information technology has become essential for many companies. Moreover, managers are increasingly beginnning to use computers to facilitate them in their informational and decisional roles in companies.

Several business information systems can be identified, and the role of computers is important in each. Using this framework of the five business information systems software usages by managers can be determined. And while there are as many different software applications as there are different managerial functions of an organization, certain software - word processing, spreadsheet, database, etcetera - is used by most managers. Companies also make use of high power business intelligence software. But the price of this software is high and is thus mostly used by larger companies.

While determining the software used by managers is an easy task, it is difficult to determine whether business schools play an important role in training the manager in the use of software. There are several methods that researchers use for gathering data, including the use of observation, interviews, and questionnaire, however a perusal of the literature shows that the questionnaire method is the one typically used by researcher for obtaining information in this area. Three methods employing questionnaires include: surveying students who are currently managers, determining whether the skills deemed

necessary by managers are taught in business schools, and determining whether educators and managers rate certain skills as being equally important. Although the last two methods do not attempt to measure the effectiveness of business school training, they do help to determine whether business schools and managers are on the same wavelength as to what is important and if it is being taught.

CHAPTER THREE

METHODOLOGY

The purpose of this study is to answer the main research question first presented in Chapter One: *How do managers use computers, and how do business programs in universities, colleges and technical institutes prepare future managers with the computing skills they need?* To answer this question, it was decided that data would be gathered from managers of companies and educators at universities and colleges. The chosen method of data collection was the mailing of two survey instruments, one to educators and the other to managers. Details of the research design follow.

3.1 SELECTION OF THE POPULATIONS AND SAMPLES

The major research question considers the interaction between three important groups: managers, educators, and computers. In particular, the study considers the ways that managers use computers and the role that educators play in training future managers to use computers. Thus two main groups of people - educators and managers - were targeted in this study.

3.1.1 The Educators Survey - Population and Sample

It was decided that the best group to represent the educational component of this study was the educators in Business Administration and Commerce programs in Alberta's universities, colleges, and technical institutes. Several reasons can be given for the choosing of this specific group: First, Business Administration and Commerce programs were chosen as these post-secondary educational programs most likely to train future managers. That is, post-secondary students with managerial aspirations are most likely to enroll in these programs than in other programs. Office Administration, Legal Assistance and other programs with a business focus were not included in the population because these programs teach students who generally intend on working in clerical and other non-managerial roles in the company. MBA programs were not considered in the selection of the population as the number of educators teaching in MBA programs is small, and these educators are also likely to teach in Business Administration and Commerce programs as well.

Only Alberta universities, colleges, and technical institutes were considered. Under the jurisdiction of the Advanced Education department of the Province of Alberta, these institutions by necessity engage is considerable interchange of ideas and curricula. Most of these institutions - excepting perhaps the large universities - have more contact with other provincial educational institutions than with institutions further abroad. The private for-profit business schools were not included in the population. These schools do not fall under the jurisdiction of the department of Advanced Education. Furthermore, these schools are more akin to the Office Administration, Legal Assistance, and similar programs. Finally, as an instructor in the Business Administration and Commerce

programs at Red Deer College, the researcher is most interested in the Alberta job market and the educational institutions that serve that market.

The sample included all full-time educators of all post-secondary institutes that offer diplomas or degrees in Business Administration and Commerce. Institutes sampled included:

University of Alberta
University of Calgary
University of Lethbridge
Augustana University
Concordia College
Fairview College
Grant MacEwan Community College
Grande Prairie Regional College
Keyano College
Lakeland College
Lethbridge Community College
Medicine Hat College
Mount Royal College
Northern Alberta Institute of Technology
Olds College
Red Deer College
Southern Alberta Institute of Technology

Athabasca University was not included in the study as it does not have a program with full-time attending students in Business Administration or Commerce programs. Moreover, the private for-profit business schools were not included in the population .

Only full-time educators were sampled. Part-time instructors were considered to be less likely to be involved in the decision making, goal setting, and setting of the business curricula and hence less informed of the issues involved in using computers to teach future managers.

3.1.2 The Companies Population and Sample

The companies population includes all managers of companies in central Alberta. Only companies in central Alberta were considered as these are the ones most likely to

receive graduates of Red Deer College and the two major universities, and hence are of the most interest to the researcher.

A sample size of between 80 and 120 was determined to be sufficient in order to extrapolate meaningful information from the data in an exploratory research study - yielding a ten percent margin of error from the estimates obtained from the data. A stratified sample design was deemed to be most appropriate, allowing company representation from all major business sectors. A listing of these sectors appears in question 1.5 of the companies survey found in the appendix.

3.2 INSTRUMENTATION

3.2.1 The Educators Questionnaire

A mail-out questionnaire was deemed to be the most appropriate instrument used to collect data from the 400 Business Administration and Commerce educators in Alberta. It was determined that the length of the questionnaire, and the complexity of the questions asked made the administration of the survey by telephone or personal interview too costly and ineffective. The eight page educators questionnaire, can be seen in its entirety in the appendix.

The first section of the educators questionnaire - entitled 'Demographics' - was designed to gather demographic information about the respondents to be used for cross-tabulation and descriptive purposes. The second section - entitled 'Necessary Skills for Business Graduates' - was included to determine educators' views of their role in

teaching future managers. That is, it attempts to answer in part, the first two operational research questions: "Do business school educators believe that they are training future managers?" and "Do managers and educators attach the same relative importance to specific managerial skills?" The third section - entitled 'The Importance of Specific Computing Skills/Concepts' - was designed to answer in part, the fourth and fifth operational research questions: "Do current managers and educators attach the same relative importance to future managers knowing specific computing knowledge concepts?" and "Do managers and educators attach the same relative importance to future managers knowing how to use specific computer applications?".

The second and third sections of the educators survey mentioned above are the fundamental sections of the educators survey in that they help to determine if managers and educators agree as to what are the important skills and knowledge concepts a manager must know. The last three sections gather information that are mostly used for descriptive rather than comparative purposes. They show how the teaching and use of computers in business schools is manifested. The fourth section - entitled "The Business Computing Course" - looks specifically at courses where the primary focus is the teaching of computing skills to business students. It helps address the third operational research question: "Do educators believe that computing skills and knowledge concepts should be taught in business schools?". The fifth section of the survey - entitled "The Role of Computers in Your Courses" - is designed to answer the sixth and seventh operational research questions: "How are computers used in business courses?" and "How do students learn application skills?".

The sixth section of the survey - entitled "The Role of Computers in Your Program" also helps to address the third operational research question mentioned above: "Do educators believe that computing skills and knowledge concepts should be taught in business schools?"

3.2.2 The Companies Questionnaire

A mail-out questionnaire was also used to collect data from managers. Because of the complexity of the questions and the cost of administration, neither a phone survey nor personal interview survey was deemed to be appropriate. The four page companies questionnaire is included in the appendix.

The first section of the questionnaire - entitled "Demographics" - was included to obtain pertinent classification data used for cross-tabulation and descriptive purposes. The second and third sections - entitled " Necessary Skills for Managers" and "The Importance of Specific Computing Skills/Concepts" - included some questions identical in content to those in the corresponding sections of the educators questionnaire. These were included to answer the second, fourth, and fifth operational research questions mentioned above: "Do managers and educators attach the same relative importance to specific managerial skills?", "Do current managers and educators attach the same relative importance to future managers knowing specific computing knowledge concepts?", and "Do managers and educators attach the same relative importance to future managers knowing how to use specific computer applications?". These sections also included questions asking managers to name specific software used and to also indicate the uses of this software. These questions are designed to help answer the eighth and ninth

operational research questions: "What are the main software applications used by managers?" and "For what purposes are software applications used by managers?"

Some questions in the fourth section - entitled "Educating Present and Future Managers" - also help address the above mentioned operational research questions. But two other questions in this section are perhaps the most important questions of the study. Question 4.4 - "How do existing managers learn to use the computer?" - is designed to answer the tenth operational research question: "How do existing managers learn to use the computer." And question 4.1 - "Do colleges and universities adequately prepare future managers with the computing skills / knowledge base that they need to be productive managers in your area in the firm?" - is included to address the eleventh operational research question: "Is the teaching of computing concepts and software usage in business schools deemed adequate by managers?"

3.3 DATA COLLECTION PROCEDURES

A pilot survey of eleven Business Administration and Commerce educators at Red Deer College and the University of Alberta was first conducted during May of 1995. The educators questionnaire was then administered during May and June of 1995. No random selection procedure was used to select participants in the educators survey as questionnaires were sent to all members of the population. Chairpersons or deans of Business Administration and Commerce departments in the seventeen institutions listed on page 48 of this chapter were initially contacted by telephone to determine the number

of full-time educators in their departments or faculties. A package was then sent to each chairperson including one questionnaire for each full-time educator, along with a cover letter to the chairperson and a cover letter to each educator. Copies of the cover letters can be found in the appendix.

Respondents were asked to mail the completed questionnaire back to Red Deer College using the government courier. Three weeks after the questionnaires were distributed a second letter was sent to all educators via the chairperson, reminding the participants to complete and return the questionnaire. 110 questionnaires were completed and returned resulting in a twenty-eight percent response rate. A sample size of 110 yields a nine percent margin of error on estimates obtained from the survey, nineteen times in twenty.

Following a pilot survey of five managers, the companies survey was administered during July of 1996. A stratified sampling design was formulated to ensure representation from both large and small companies, and from all of the major industrial sectors, as listed in question 1.5 of the companies survey. Moreover, since the primary market for Red Deer College graduates is the central Alberta region, it was decided that approximately sixty percent of the respondents should be from Red Deer and the surrounding area. It was also decided that approximately twenty percent of the respondents should come from the Edmonton area with an additional twenty percent from the Calgary area. This was done to ensure representation of the larger companies, which tend to be located near the big cities, and of the industries - such as the natural resources industry - which are not well represented in the Red Deer region.

The Chambers of Commerce were contacted in all three cities. The two larger cities supplied lists of their largest companies, and the Red Deer Chamber of Commerce supplied a list of retailers in the Red Deer area. These lists, along with the yellow pages from the three telephone books were used to establish a frame from which the sample could be drawn. A systematic random selection procedure was then used to select twelve companies from each industrial sector. The selection procedure also ensured selections of both large and small companies, along with representatives from the three geographic areas in the proportions described above.

Each of the companies was then telephoned, and support for the survey was first elicited from the human resources manager - or general manager in the case of smaller companies. In order to assure representation from all manager types, the researcher then requested participation of the human resources manager or general manager, or a manager in the accounting/financial, marketing, production, or computing systems division of the company.[1] A systematic selection method was used to ensure that managers from each of these areas were included as participants in the survey. A copy of the dialog used by the researcher to elicit participation can be found in the appendix.

Upon eliciting participation of the managers, the questionnaire was faxed to participants. Participants were asked to fax the completed questionnaire back within two working days. One follow-up call was made to participants failing to return the questionnaire.

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[1] This listing of manager types comes from Schultheis and Sumner, 1995.

Eighty-two completed questionnaires were received resulting in a sixty-seven percent response rate. A sample size of eighty-two yields estimations with an eleven percent margin of error, nineteen times in twenty.

3.4 DATA ANALYSIS

The purpose of the study was to conduct exploratory research to determine the uses of computers by managers and the role that business schools play in teaching future managers how to use the computer. Due to the size of the samples and the exploratory nature of the study, most of the analysis involves simple tallies and percentages. Moreover, some of the questions in the questionnaires demanded qualitative responses, which have been collected and listed in the appendix. Common responses are noted, where applicable, in chapter four.

A major part of the research consists of the comparison of questions is sections two and three of both questionnaires. These questions, discussed previously in this chapter, are used to determine the degree of concordance between the importance placed by educators on certain skills and knowledge concepts and the importance placed by managers on these same concepts. A series of statistical analyses, including Friedman's tests, Spearman's rank correlation tests, binary logit regression analysis, and chi-squared tests for homogeneity are used to determine the degree of concordance between respondent groups. These procedures will be discussed in full in the next chapter.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

Two survey instruments were used to collect data from educators and managers. These will be referred to as the 'educators survey' and the 'companies survey.' This chapter presents the results of the analyses of these two surveys in the context of the operational research questions introduced in the first chapter. This chapter will begin with a brief discussion of the demographics of the two responding groups.

4.1 EDUCATORS SURVEY - DEMOGRAPHICS

400 questionnaires were sent to Alberta educators in Business Administration and Commerce programs in Alberta's public universities, colleges, and technical institutions. 110 surveys were completed and returned resulting in a twenty-eight percent response rate. Respondents were classified according to institution type, program, and discipline. The results appear on the next page. One-third of respondents teach in a university, while the other two-thirds teach in colleges or technical institutes.[1] Of the seventy-four educators who teach in colleges or technical institutes, sixteen teach both university transfer and diploma courses. University transfer students are those who take their first

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[1] Frequency counts and comments for all variables can be found in the appendix.

one or two years at a college and then transfer to a university to complete their degree.

Table 3 - Demographics: Educators Survey

		Count	Percentage
In what type of institution do you teach?	University	36	33[2]
	College / Technical Institute	74	67
In what type of Business program do you teach?	University / University Transfer	36	33
	Business Diploma / Certificate	58	53
	Both	16	15
What is your discipline?	Accounting	32	29
	Finance	5	5
	Man. Science/Statistics/Bus.Math	10	9
	Business Computing	14	13
	Human Resources/Industrial Rel.	3	3
	Organiz. Behav./Organiz. Anal.	6	6
	Business Law	3	3
	Marketing	19	17
	Business Economics	4	4
	Business Policy /General Manag.	5	5
	Business Communications	6	6

Question 1.3 of the educators survey asked respondents to indicate their areas of academic expertise. The table above shows the number of respondents that indicated a particular discipline as their main discipline (a ranking of 1). It is evident from the table that disciplines with a strong quantitative focus - such as accounting, management science, and computing - are well represented. Relatively few respondents can be

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[2] Percentages were calculated based on the total 110 respondents. For any particular question the percentages may not add to 100 as one or more respondent failed to respond.

classified in non-quantitative disciplines. Thus, a possible pro-computing bias may be present in the analyses due to the dependency on the computer in many quantitative disciplines. Marketing, which may have either a quantitative or qualitative focus, depending on course and instructor, is also well represented.

In the analyses to follow the institution variable (question 1.1 - university versus college/technical institute) will be used as a classification variable to determine if university educators and college[3] educators have similar beliefs and practices. However no cross-comparisons will be made with question 1.2 (type of program) or question 1.3 (discipline) because the categories for these questions are not mutually exclusive. For instance, although all educators indicated their main discipline, most also indicated that they teach courses in other disciplines as well.

4.2 COMPANIES SURVEY - DEMOGRAPHICS

120 questionnaires were sent to managers in the Red Deer, Edmonton, and Calgary regions, with eighty-two returning, yielding a sixty-seven percent response rate. Demographic statistics appear in the table on the next page. Approximately sixty percent of respondents are from the Red Deer region; approximately twenty percent are from each of the two larger cities. Almost one-half of the managers claim to be general managers. These managers are typically the only managers or owners of small companies which

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[3] For the remainder of this chapter, the term 'college instructors' will refer to instructors from both college and technical institutions.

consist of only a few employees. Of the larger companies, the greatest response came from accounting / finance managers and human resources managers.

Table 4 - Demographics: Companies Survey

		Count	Percentage
In which functional business area are you a manager in your firm?	General Manager	39	48
	Accounting / Finance	17	21
	Marketing / Sales	2	2
	Manufacturing	3	4
	Information Systems /Computing	7	9
	Human Resources	14	17
In which city / area are you located?	Red Deer	52	63
	Edmonton	16	20
	Calgary	14	17
In which industrial sector is your firm best placed?	Agriculture	4	5
	Natural Resources	10	12
	Manufacturing	10	12
	Construction	9	11
	Transportation	3	4
	Communication / Other Utilities	9	11
	Retail / Wholesale Trade	9	11
	Finance / Insurance	9	11
	Other Business Services	7	9
	Government / Public Services	12	15
Approximately how many employees are employed in your firm?	1 - 99	53	65
	100 - 499	11	13
	500 - 999	7	9
	1000 - 4999	8	10
	5000 +	3	4

Approximately ten to fifteen percent of respondents came from each of the ten industrial sectors, excepting the transportation and agriculture sectors which are under-represented. However the number of respondents for each category was too small to be used for cross classification purposes when analysing other questions.

A wide range of company sizes is represented among the respondents. Almost two thirds of the companies have less than 100 employees. These have been classified as 'small' companies. The other one-third of companies have sizes ranging from 100 to over 5000. The three largest companies have 5500, 10000, and 23000 employees respectively. Companies with over 100 employees are classified as 'large' companies. While it may be argued that a company with 23000 has little in common with a company of 100 they have been classified together for four reasons:

(1) Companies with at least 100 employees are most likely to have more than one manager in the company, whereas many of the smaller companies have only one manager.

(2) The largest companies will have more than one division or department, which are often considered by managers and employees to be their main organizational unit. Thus a very large company with thousands of employees may have departments of sizes comparable to those in companies of 100 to 500 employees.

(3) Moreover, some of the largest companies do not have divisions contained in the same geographical area but rather have divisions in other regions as well. A division of a few hundred employees may operate relatively autonomously from other divisions in the company.

(4) Breaking the companies into more than two size classes makes cross-tabulation of this variable with others meaningless as the counts are too low.

4.3 THE TRAINING OF MANAGERS IN BUSINESS SCHOOLS

In order to answer the main research question - *How do managers use computers, and how do business programs in universities, colleges and technical institutes prepare future managers with the computing skills they need?* - it must first be determined that business schools play a role in educating future managers.

4.3.1 Research Question Q1

Do business school educators believe that they are training future managers? Do managers in companies believe that business schools are a supplier of future managers?

Question 2.2 of the educators survey asks respondents to estimate the percentage of students in their institution who will attain managerial positions in the next five years. The table below shows that forty-one percent of educators believe that at least forty percent of their graduates will attain managerial positions. This indicates that educators believe that they play a role in educating future managers.

Table 5 - Educators' Estimates of the Percentage of Graduates Who Will Become Managers

	Count	Percentage
0%	1	1
1% - 19%	23	21
20% - 39%	39	36
40% - 59%	22	20
60% - 79%	13	12
80% - 100%	10	9

Similarly, managers believe that universities and colleges are suppliers of future managers. Question 1.9 of the companies survey asked respondents to estimate the percentage of managers in their firm who graduated from a business school. The table below indicates that fifty-five percent of respondents believe that at least forty percent of managers in their firm have graduated from a business school. Only twenty-two percent of respondents indicate that no manager in their firm holds a business degree or diploma. It is likely that these are small companies with only one or few managers.

Table 6 - Managers' Estimates of the Percentage of Their Managers Graduated From a Business School

	Count	Percentage
0%	16	22
1% - 19%	7	10
20% - 39%	9	13
40% - 59%	16	22
60% - 79%	10	14
80% - 100%	14	19

4.3.2 Research Question Q2

Do managers and educators attach the same relative importance to specific managerial skills?

- **Are there significant differences in how university professors and college instructors rank these skills?**
- **Do educators rank these skills the same for both future managers and general business graduates?**
- **Are there significant differences in how managers from large companies and managers from small companies rank these skills?**

Effective business schools are those that equip future managers with the skills and knowledge concepts that they need. But first there must be agreement between companies and business schools that certain skills and knowledge concepts are important. The extent of agreement between the two groups is a major focus of this study. Specific computer skills and knowledge concepts will be considered later in the paper, but an initial step is to consider several general business skills and determine whether there is concordance between the two groups as to which skills are most important.

Questions 2.1 in both the educators and companies survey asked respondents to choose, from a list of thirteen, the four most important business skills needed by managers. Educators were also asked to choose the four most important business skills needed by a general business student graduating from their program.

The following table shows the number of respondents who chose particular skills as being one of the four most important business skills. For instance, the first row shows that thirteen of the 110 educators chose skill 1 (planning) to be one of the top skills needed by a general business student graduating from the program. Of these thirteen educators, two are university professors and eleven are college instructors. Thirty-nine

of the 110 educators - of which ten are university professors and twenty-nine are college instructors - believe that planning is a top skill needed by future managers.

Table 7 - Number of Respondents Who Ranked the Skill As A Top Four

	EDUCATORS SURVEY General Business Skills			EDUCATORS SURVEY Managerial Skills			COMPANIES SURVEY Managerial Skills		
Skill	**All**	**Univer.**	**College**	**All**	**Univer.**	**College**	**All**	**Small**	**Large**
1	13	2	11	39	10	29	36	20	16
2	20	4	16	34	11	23	33	22	11
3	71	24	47	64	22	42	43	26	17
4	56	16	40	46	13	33	27	19	8
5	7	1	6	60	15	45	41	24	17
6	2	1	1	19	6	13	12	9	3
7	69	19	50	53	21	32	25	15	10
8	68	25	43	48	18	30	8	4	4
9	25	12	13	18	6	12	15	10	5
10	34	7	27	7	2	5	11	10	1
11	22	14	8	7	4	3	11	8	3
12	21	4	17	4	2	2	19	11	8
13	17	2	15	11	0	11	40	26	14
Max.	**110**	**36**	**74**	**110**	**36**	**74**	**82**	**53**	**29**

Skills Key

1. planning
2. organizing
3. problem solving /creativity
4. team skills
5. leadership
6. supervision
7. oral communication
8. written communication
9. information extraction / analysis
10. computer usage
11. theoretical knowledge
12. technical skills
13. customer / external relations

And thirty-six of eighty-two responding managers - of which twenty are managers of small companies and sixteen are managers of large companies - rank planning as being

one of the top four skills needed by managers. High numbers indicate that many respondents consider the skill to be important.

However it is possible that two skills may have the same frequencies in the table, and yet one skill may generally be assigned rankings of three or four by respondents whereas the other skill is generally assigned rankings of one or two. What is needed is a method to determine if there is a significant difference between the rankings of the skills by a particular group of respondents. A Friedman's procedure accomplishes this (Jobson, 1991, p. 437). The procedure starts by considering the rankings given to each of the thirteen skills by a single respondent. If ties occur, an average ranking is assigned to the tied skills. For example, if the respondent rated two skills as '2', then the Friedman's procedure assigns a ranking of 2.5 to each - thus accounting for a tie between the second and third ranked skills. Skills that are left unranked are assigned a five. The Friedman's test uses a similar procedure for each respondent, whereupon all ranks assigned to a particular skill are then summed over all respondents. The procedure then determines if there are significant differences between the sum of ranks of the thirteen variables together. Example input and output for a Friedman's test can be found in the appendix.

The table below shows how educators and managers ranked the thirteen skills in terms of their importance to future managers. Educators consider the seven most important managerial skills to be: leadership (5), problem solving /creativity (3), oral communication (7), team skills (4), written communication (8), planning (1), and organizing (2). Managers consider the seven most important managerial skills to be: leadership (5), problem solving / creativity (3), customer / external relations (13), planning (1), organizing (2), team skills (4), and oral communication (7). Thus, six of the

seven skills deemed most important by educators are also in the managers' top seven list. Moreover, leadership and problem solving / creativity are considered to be the two most important skills by both groups.

Some discrepancies exist between the two groups. Oral communication (7) is ranked third by educators but only seventh by managers. Written communication (8) is ranked fifth by the educators, but is ranked last (thirteenth) by managers. Technical skills (12) is ranked thirteenth by educators but is ranked eighth by managers. And customer / external relations (13) is ranked third by managers but only tenth by educators.

Upon classifying educators' rankings according to type of educator the table shows that university professors deem leadership (5) to be less important that other skills whereas college instructors and managers deem leadership to be the most important skill. University instructors attach less importance to customer / external relations (13) than do college instructors. This skill was ranked third by managers.

Upon classifying managers' rankings according to size of company the table shows that large companies consider planning (1) to be quite important, with a ranking of three, whereas small companies and educators gave this skill a ranking of six. Small companies consider written communications (8) to be the least important of the thirteen skills, whereas large companies consider it to be tenth in importance. Conversely, large companies consider computer usage to be the least important of the thirteen managerial skills, whereas small companies rank it as tenth in importance. Educators gave similar low rankings to computer usage. It must be noted that whereas computer usage is considered by managers to be one of the least important skills of the thirteen skills, this does not imply that it is an unimportant skill. This will be shown later in the paper.

Table 8 - Rankings of Managerial Skills by Educators and Managers

Business / Managerial Skills	EDUCATORS SURVEY Ranks of Managerial Skills			COMPANIES SURVEY Ranks of Managerial Skills		
	All Educators	University Educators	College Educators	All Companies	Small Companies	Large Companies
	n = 110	n = 36	n = 74	n = 82	n = 53	n = 29
1	6	6	6	4	6	3
2	7	7	7	5	4	5
3	2	1	2	2	3	2
4	4	5	3	6	5	7
5	1	4	1	1	1	1
6	8	9	8	10	11	12
7	3	2	4	7	7	6
8	5	3	5	13	13	10
9	9	8	9	9	9	9
10	12	12	11	12	10	13
11	11	10	12	11	12	11
12	13	11	13	8	8	8
13	10	13	10	3	2	4
Friedman's P-value	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Skills Key

1. planning
2. organizing
3. problem solving /creativity
4. team skills
5. leadership
6. supervision
7. oral communication
8. written communication
9. information extraction / analysis
10. computer usage
11. theoretical knowledge
12. technical skills
13. customer / external relations

Educators were also asked to determine the four most important skills needed by students graduating with a general business degree; not necessarily those students intending on becoming managers. The table below shows how these rankings compare to the managerial skills rankings made by educators. According to educators, the seven top skills needed by general business graduates are: problem solving / creativity (3), oral communication (7), written communication (8), team skills (4), computer usage (10), information extraction / analysis (9), and theoretical knowledge (11). And as listed before, educators consider the seven most important managerial skills to be: leadership (5), problem solving /creativity (3), oral communication (7), team skills (4), written communication (8), planning (1), and organizing (2). Thus only four of the skills appear in both lists. Of considerable interest to this study is the increase in importance in the educators' list, of skills 9, 10, and 11 - information extraction / analysis, computer usage, and theoretical knowledge respectively. Whereas these skills are deemed to be relatively unimportant managerial skills, they are deemed to be of greater importance for the general graduate. An implication here could be that educators believe managers engage in less hands-on computer use than other workers.

Other discrepancies in rankings between the two lists include technical skills (12) which is also considered to be more important to the general business graduate than to the manager. Conversely, planning (1), supervision (6), and leadership (5) are deemed to be more important to the manager than to the general business graduate. In the latter case leadership is deemed to be the most important managerial skill but is only ranked twelfth in the list of thirteen skills for the general business graduate.

Table 9 - Rankings of General Business Skills and Managerial Skills by Educators

Business / Managerial Skills	EDUCATORS SURVEY Ranks of General Business Skills			EDUCATORS SURVEY Ranks of Managerial Skills		
	All Educators n = 110	University Educators n = 36	College Educators n = 74	All Educators n = 110	University Educators n = 36	College Educators n = 74
1	11	11	10	6	6	6
2	9	9	7	7	7	7
3	1	1	2	2	1	2
4	4	4	4	4	5	3
5	12	12	12	1	4	1
6	13	13	13	8	9	8
7	2	3	1	3	2	4
8	3	2	3	5	3	5
9	6	6	9	9	8	9
10	5	7	5	12	12	11
11	7	5	11	11	10	12
12	8	8	6	13	11	13
13	10	10	8	10	13	10
Friedman's P-value	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Skills Key

1. planning
2. organizing
3. problem solving /creativity
4. team skills
5. leadership
6. supervision
7. oral communication
8. written communication
9. information extraction / analysis
10. computer usage
11. theoretical knowledge
12. technical skills
13. customer / external relations

In further classifying the rankings according to type of educators, two apparent major discrepancies appear: university professors consider information extraction / analysis (9) to be a more important skill than do college instructors; similarly, theoretical knowledge is also deemed by university professors to be a more important skill than do college instructors. In the latter case university professors ranked this skill as fifth whereas college instructors ranked it eleventh.

Every column in both of the above two tables, shows a Friedman's p-value of 0.00. The p-values of 0.00 indicate that within each column there are significant differences in the rankings between the thirteen skills. That is, the top ranked skills are considered to be significantly more important than the bottom ranked skills. But the Friedman's test does not test to see if there are significant differences between columns. However a series of Spearman's ordinal correlation tests achieve this purpose (Jobson, 1991, p. 113). The table below shows the Spearman's correlation coefficient and p-values, in parentheses, for various parings of columns. A high correlation coefficient yields a low p-value, indicating a strong correlation or agreement between how the skills are ranked.

Table 10 - Spearman's Correlations For Business / Managerial Skills Rankings

		EDUCATORS SURVEY General Business Skills			EDUCATORS SURVEY Managerial Skills			COMPANIES SURVEY Managerial Skills		
		All	Univer.	College	All	Univer.	College	All	Small	Large
EDUCATORS SURVEY General Business Skills	All				.23 (.790)					
	Univer.			.81 (.000)		.49 (.043)				
	College		.81 (.000)				.27 (.187)			
EDUCATORS SURVEY Managerial Skills	All	.23 (.790)						.53 (.030)		
	Univer.		.49 (.043)				.88 (.000)	.30 (.162)		
	College			.27 (.187)		.88 (.000)		.53 (.030)		
COMPANIES SURVEY Managerial Skills	All				.53 (.030)	.30 (.162)	.53 (.030)			
	Small									.89 (.000)
	Large								.89 (.000)	

A correlation of .53 shows that there is agreement between managers' and educators' rankings of which skills are most important to managers. A .53 correlation also shows that college instructors alone assign the ranking similar to the way managers assign the rankings. However, the correlation coefficient of .30 shows that there is little agreement between university professors' rankings of skills important to managers and managers' rankings of these same skills. The correlation of .89 shows that managers of small companies tend to rank the skills in a similar way to managers of large companies.

The high correlations of .81 and .88 indicate that university professors and college instructors tend to give similar rankings for both the skills needed by general business graduates and those needed by future managers. However, the low correlation of .23

shows that educators tend to rank the skills needed by general business graduates differently than they do for the future manager. The low correlation of .27 shows that college instructors rank the two skill sets quite differently; however the correlation of .49 indicates that there is little difference in the way university instructors rank skills needed by managers and general business graduates.

In summary, the Friedman's tests show that both educators and managers consider there to be significant differences in the importance of the skills. Some skills, such as leadership and problem solving / creativity are considered by all to be important skills needed by managers; others such as theoretical knowledge are considered to be of relatively little importance. College instructors and managers tend to rank the skills in similar ways, but there is little agreement between university professors and managers in their rankings of the skills. College instructors tend to rank the skills needed by general business graduates differently than they rank the skills needed by managers. University professors rank them similarly. Finally, the size of the company has little bearing in how the skills are ranked.

4.4 THE IMPORTANCE OF COMPUTING TO MANAGERS AND EDUCATORS

In the above section the analyses show that educators do believe that they are training future managers, and managers agree that many of the managers in their companies are graduates of business schools. Moreover, there is general agreement between the two groups as to what are the important skills needed by managers.

Computer usage is just one skill of many, and it was found that computer usage is considered to be less important than most of the other skills listed. However, this does not imply that computer usage is deemed unimportant by managers and educators. This section attempts to determine the importance of specific computer skills and knowledge concepts to managers and educators.

4.4.1 Research Question Q3

Do educators believe that computing skills and knowledge concepts should be taught in business schools?

The results from Question 4.1 of the educators survey show that forty-two percent of university professors and eighty-six percent of college instructors maintain that students in business programs should be required to take a computing course. Fifty-two percent of university professors and fourteen percent of college instructors maintain that students should be required to take a computing course only if they haven't acquired the skills or theory elsewhere. Only three percent of educators think that business students should not be required to take a computing course.

Moreover, results from question 4.2 of the educators survey show that of the ninety-seven percent of educators who believe that business students should be required to take a computing course, ninety-one percent maintain that students should take their first computing course in the first year of their program, and the remaining nine percent of educators maintain that students should take their first computing course in the second year of their program.

Results from question 4.3 of the educators survey indicate that only forty-percent of educators, who believe that a computing course is necessary, agree that a single term - half year course in computing is sufficient for business students. The remaining fifty-eight percent believe that two or more courses is necessary, and/or that computer usage should be integrated into other courses.

Questions 4.5 and 4.6 of the educators survey reveal that seventy-two percent of university professors and ninety-three percent of college instructors state that their students are required to take a computing course. Sixty-seven percent of university professors and eighty-three percent of college instructors maintain that instructors in their business programs teach the business computing course. Eight percent of all educators maintain that an instructor external to the business program teaches the business computing course.

When asked if university business students have different computing needs than business diploma students two educators asserted that university business students must have a broader theoretical base in computers, three maintained that university business students need greater analytical and technical computing skills than diploma students, and three educators simply said that university business students needed more computing skills than diploma students. There was little agreement among the other few comments offered by educators in answering this question.

Finally the last section of the educators survey asked instructors whether their departments or faculties have a specific plan for the integration of computers into the business curriculum (question 6.4), at what rate computers have been integrated into the business program in the past three years (question 6.5), and at what rate should they be

integrated into the curriculum in the next three years (question 6.6). Forty-eight percent of university professors and fifty-nine percent of college instructors claim that their departments or faculties do have a specific plan for the integration of computers into the curriculum. Forty-seven percent of both university professors and college instructors claim that the integration of computers into the business curriculum has been quick or very quick in the past three years. Furthermore, seventy percent of university professors and seventy-eight percent of college instructors maintain that the integration of computers into business courses should continue during the next three years at a quick or very quick pace.

The conclusion from the analysis for this question is that most educators attach considerable importance to their students learning to use the computer, and that integration of the computer into the business curriculum should continue at a rapid pace during the next few years.

4.4.2 Research Question Q4

Do current managers and educators attach the same relative importance to future managers knowing specific computing knowledge concepts?

- **Are there significant differences in how university professors and college instructors rate the importance of these knowledge concepts?**
- **Do educators consider these knowledge concepts to be equally important for both the general business graduate and future manager?**
- **Are there significant differences in how managers from large companies and managers from small companies rate these knowledge concepts?**

Question 2.1 of both the educators and companies survey listed six specific computer knowledge concepts and asked respondents to assess on a four point scale,

where 1 = very unimportant, 2 = somewhat unimportant, 3 = somewhat important, and 4 = very important, the importance of each of six computer knowledge concepts to managers. The educators survey also asked respondents to assess the importance of the knowledge concepts to the general business graduate.

The table below shows the median rating for each knowledge concept classified by type of educational institution (university or college), or by size of company (small or large). A median rating of four indicates that at least fifty percent of respondents of a particular classification view the concept as being very important, whereas a median rating of two indicates that at least fifty percent of the respondents view the concept as being somewhat or very unimportant. The median rating for most concepts is three signifying that most respondents believe the concept to be somewhat or very important for managers to know. The six concepts were also ranked one to six, based on their means; the concept with the highest mean scoring a rank of one, and the concept with the lowest mean scoring a ranking of six. It is important to note that calculating a mean for ordinal data has little statistical value and is used only to give a rough indication of the order of importance of the concepts. It does not imply that a concept with a ranking of one is significantly more important to managers than a concept with a ranking of two. Nor should any other statistical inferences be drawn from the rankings.

Nevertheless, consistency in ranking across the classifications of respondents does indicate which concepts are considered more important that others. Concept #2 - ethics of information access and usage achieves the highest ranking across almost all groups of respondents, with concept #1 - cost/benefit analysis of technology acquisition also achieving a very high ranking. Concept #6 - transaction processing systems design is

considered to be the least important among the educators - achieving a consistent ranking of five or six, while network/communication technologies achieves the lowest ranking of the concepts among the managers.

Table 11 - Importance of Computer Knowledge Concept to Educators and Managers

	EDUCATORS SURVEY Importance Ratings of Concepts for General Bus.						EDUCATORS SURVEY Importance Ratings of Concepts for Managers						COMPANIES SURVEY Importance Ratings of Concepts for Managers					
	All		Univer.		College		All		Univer.		College		All		Small		Large	
Concept	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank
1	3	2	3	2	3	2	3	2	4	1	3	2	3	2	3	1	3	2
2	3	1	3	1	3	1	3	1	3	2	4	1	3	1	3	2	3	1
3	3	4	3	5	3	4	3	5	2	6	3	5	3	5	3	3	2	6
4	3	3	3	3	3	3	3	3	3	4	3	3	3	6	3	6	3	5
5	3	5	2	4	3	5	3	3	3	3	3	4	3	3	3	4	3	3
6	2	6	2	6	2	6	3	6	2	5	3	6	3	4	3	5	2	4

Knowledge Concepts Key

1. cost/benefit analysis of technology acquisition
2. ethics of information access and usage
3. computing hardware
4. network/communication technologies
5. decision support systems design
6. transaction processing systems design

Of greater importance to this study is an analysis of whether there are significant differences in ratings between the respondent groups. Two statistical procedures are used to assess differences in ratings. A binary logistic regression procedure (Jobson, 1992, p. 285) is used to consider the effect of all six concept variables together in determining whether a difference exists between two groups of respondents or groups of questions. The dependent variable in a binary logit model is comprised of 1s and 0s. For instance, by letting a 1 indicate that the respondent is a manager, and 0 to indicate that the respondent is an educator, a regression is performed using the ratings of the six

knowledge concepts as explanatory variables. The logit regression procedure attempts to determine the probability that a particular respondent belongs to a particular class - in this case, either the educators class or managers class of respondents. The resulting logit model consists of a series of coefficients - one for each variable - and associated p-values. A low p-value indicates that one group of respondents tended to assign higher ratings to the concept than the other group of respondents. Moreover an overall p-value can be determined, showing whether all variables together show significant differences between the ratings of the two groups. Example input and MINITAB output for a logit regression appears in the appendix.

The logistic regression procedure has the advantage of considering all variables together, and hence their interactions with each other, in determining differences between groups. However the logit model assumes that the explanatory variables are interval in nature, yet the ratings are clearly ordinal. Thus, by itself the logistic regression procedure yields questionable results, but is nevertheless a powerful procedure when further analyses is done using one or more non-parametric statistical tests. Hence, a series of chi-squared tests for homogeneity (Jobson, 1992, p. 11) are performed for each variable separately to determine if one group tends to rate a specific knowledge concept differently than another. The test for homogeneity determines the number of respondents in each group that assigned a particular number to the skill. The relative frequencies distribution of one group is then compared to the other. Significant differences in distributions indicate that the two groups rate the skill differently.

The two tables below show the logit coefficients and their p-values along with p-values for the chi-squared tests for homogeneity. A low p-value for either test indicates significant differences in the ratings between the two groups.

Table 12 - Logit Analysis of Knowledge Concepts Ratings For Managers

	EDUCATORS SURVEY versus COMPANIES SURVEY Concepts for Managers			**EDUCATORS SURVEY Concepts for Managers versus Concepts for General. Bus.**		
Concept	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value
1	-0.27	.230	.443	-0.60	.008	.000
2	-0.09	.726	.113	-0.18	.477	.084
3	0.09	.733	.536	0.06	.781	.758
4	-0.52	.073	.255	0.15	.509	.607
5	-0.27	.320	.329	-0.32	.180	.025
6	0.50	.101	.486	0.06	.820	.485
Overall p-value		.250			.030	

Knowledge Concepts Key

1. cost/benefit analysis of technology acquisition
2. ethics of information access and usage
3. computing hardware
4. network/communication technologies
5. decision support systems design
6. transaction processing systems design

The first set of columns in the table considers the differences between educators and current managers in their ratings of the importance of the six knowledge concepts to managers. Only the fourth knowledge concept has a coefficient which is marginally significant. The negative coefficient indicates that educators tend to assign greater importance to managers knowing about network and communication technologies than do current managers. This agrees with the findings in the medians table that shows that a means ranking of six - the least important knowledge concept - by managers, while

educators gave it a means ranking of three. However, the tests of homogeneity indicate a p-value of 0.255, indicating no significant difference between educators' and managers' ratings. Thus, although a difference in ratings between the two groups is suspected, it may not a strong difference.

Furthermore, all other p-values for tests of homogeneity indicate no significant differences between the groups. And the overall p-value of 0.255 for all variables together in the logit model indicates that possibly with the exception of the fourth concept, there is agreement between the two groups in the importance of the six knowledge concepts to managers.

Educators were also asked to consider how important each of the six knowledge concepts are to a general business graduate. Using a coding of 1 for the ratings assigned to general business graduates and 0 for ratings assigned to managers, the logistic regression on the six knowledge concept variables indicates an overall p-value of 0.030, signifying that educators tend to rate the concepts differently for managers and general business graduates. In particular, the negative logit coefficient and associated p-value of .008, indicates that as a group, educators believe that knowledge of cost/benefit analysis of technology acquisition is more important for managers than for general business graduates. The test for homogeneity reaches a similar conclusion. Although eighty percent of educators rated the knowledge concept as being somewhat or very important to general business graduates, while eighty-five percent of educators considered it to be important to managers, forty-seven percent of educators considered this knowledge to be *very* important to managers, while only seventeen percent of educators considered this knowledge to be *very* important to general business graduates. A test for homogeneity

also shows that concept #5 - knowledge of decision support systems design is considered to be more important to managers than to general business graduates. Sixty-eight percent of educators view this concept as being important to managers, while only fifty-two percent consider it to be important to general business graduates. The p-value of .084 shows a marginal significance for concept #2, but an analysis of the percentages reveals no clear differences.

Table 13 - Logit Analysis of Knowledge Concepts Ratings - Classified by Institution and Company Size

	EDUCATORS SURVEY **Concepts for Managers** Universities vs. Colleges			**EDUCATORS SURVEY** **Concepts for General Bus.** Universities vs. Colleges			**COMPANIES SURVEY** **Concepts for Managers** Small vs. Large		
Concept	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value
1	-0.48	.146	.372	-0.46	.208	.505	0.02	.967	.211
2	0.45	.224	.604	0.29	.455	.516	-0.22	.604	.452
3	0.45	.196	.174	0.45	.156	.225	1.40	.019	.039
4	0.14	.701	.300	0.18	.596	.256	-0.38	.503	.266
5	0.37	.270	.567	0.34	.396	.385	0.48	.422	.953
6	-0.28	.456	.888	-0.16	.677	.225	-0.85	.199	.637
Overall p-value		.223			.466			.149	

Knowledge Concepts Key

1. cost/benefit analysis of technology acquisition
2. ethics of information access and usage
3. computing hardware
4. network/communication technologies
5. decision support systems design
6. transaction processing systems design

The table above shows the results of three logistic regressions and the associated tests for homogeneity. The first two logit models show that there are no significant differences in the way university professors assign their knowledge concepts importance ratings and the way college instructors assign their ratings. The third logit model shows

that there is overall agreement between how managers of small and large companies assign their ratings, with the exception of concept # 3 - computing hardware. The logit coefficient and accompanying test for homogeneity shows that managers of small companies consider knowledge of computer hardware to be a more important skill than do managers of large companies. In particular, sixty-four percent of small company managers consider knowledge in this area to be important, while only forty percent of large company managers consider this knowledge to be important. This difference likely exists because there is a greater chance that a computer technician will handle hardware problems in large companies, whereas in smaller companies, the general manager may have to handle all hardware problems.

4.4.3 Research Question Q5

Do managers and educators attach the same relative importance to future managers knowing how to use specific computer applications?

- **Are there significant differences in how university professors and college instructors rate the importance of these applications?**
- **Do educators consider knowledge of these applications to be equally important for both the general business graduate and future manager?**
- **Are there significant differences in how managers from large companies and managers from small companies rate the importance of these applications?**

Question 3.2 of the companies survey and question 3.4 of the educators survey asked respondents to rate the importance of fourteen software skills for managers. Educators were also asked to rate the importance of the skills for the general business graduate. A similar set of analyses as for question Q4 above were performed.

Table 14 - Importance of Software to Educators and Managers

Software	EDUCATORS SURVEY Importance Ratings of Software for General Bus.						EDUCATORS SURVEY Importance Ratings of Software for Managers						COMPANIES SURVEY Importance Ratings of Software for Managers					
	All		Univer.		College		All		Univer.		College		All		Small		Large	
	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank
1	4	1	4	1	4	1	3	2	4	2	3	6	3	1	4	1	3	2
2	4	2	4	2	4	2	4	1	4	1	4	1	3	4	3	4	3	1
3	3	6	3	7	3	6	3	7	3	9	3	7	3	6	3	7	3	6
4	3	4	3	3	3	5	3	4	3	3	3	3	3	6	3	6	3	8
5	3	11	2	11	3	11	3	11	3	11	3	9	2	10	2	10	2	11
6	3	7	3	7	3	7	3	6	3	7	3	3	2	9	2	9	2	10
7	3	5	3	9	3	4	3	8	3	7	3	8	3	2	3	2	3	5
8	3	8	3	5	3	8	3	5	3	4	3	5	3	3	3	3	3	3
9	3	10	3	7	3	12	3	9	3	6	3	11	3	5	3	5	3	4
10	2	13	2	13	2	13	2	14	2	14	2	14	2	12	2	11	1	13
11	3	9	3	9	3	9	3	10	3	10	3	10	2	11	2	12	2	9
12	3	3	3	4	3	3	3	3	3	5	3	2	3	8	3	8	3	6
13	3	12	2	12	3	10	2	12	2	12	3	12	2	13	2	13	2	14
14	2	14	2	14	2	14	2	13	2	13	2	13	2	14	2	14	2	12

Software Key

1. word processing
2. spreadsheet analysis
3. spreadsheet design
4. database analysis
5. database design
6. Internet/info-communication services
7. accounting
8. financial planning
9. statistical
10. mathematical modelling
11. graphics
12. presentation
13. desktop publishing
14. expert systems and other high level decision making

A perusal of the medians table shows that word processing and spreadsheet analysis skills are generally rated the highest among both educators and managers. Database analysis, and presentation software skills, also achieve high rankings among

educators, but appear to be less important to managers. Managers consider accounting, financial planning, and statistical software skills to be important skills for a manager to know. Educators and managers generally give the lowest ratings to database design, mathematical modelling, desktop publishing, and expert systems and other high level decision making software skills.

The first logit model in the table that follows shows considerable differences between educators and managers in their ratings of the importance of software skills for future managers. Evidence of these differences is supported by the p-values from the homogeneity tests. Educators gave higher ratings to nine of the skills than did managers. These skills include: spreadsheet analysis, database analysis, database design, Internet/info-communication services, statistical, graphics, presentation, desktop publishing, and expert systems and other high level decision making software skills. However, managers attach more importance to accounting skills than do educators.

The second logit model shows that educators tend to assign similar software skills ratings for both future managers and general business graduates. However the significantly low p-values for word processing and expert systems skills show that some differences do exist. In particular, the negative logit coefficient for word processing skills indicates that educators consider this skill to be more important to the general business graduate than to managers. The test for homogeneity shows that ninety-four percent of educators consider this to be an important skill for general business graduates; sixty-four percent of educators consider it to be a *very* important skill. Eighty percent of educators deem word processing to be an important skill for managers to know; only forty-five

percent consider it to be a *very* important skill. The reason for this difference likely stems from a belief that managers often delegate word processing tasks to secretarial support staff.

Table 15 - Logit Analyses of Software Ratings For Managers

Software	**EDUCATORS SURVEY versus COMPANIES SURVEY Software for Managers**			**EDUCATORS SURVEY Concepts for Managers versus Software for General. Bus.**		
	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value
1	0.54	.131	.456	1.06	.001	.010
2	-1.92	.000	.000	-0.41	.329	.922
3	0.71	.087	.073	-0.05	.874	.887
4	-0.39	.331	.002	-0.07	.854	.192
5	-0.05	.919	.024	0.15	.680	.988
6	-0.94	.005	.000	-0.32	.237	.568
7	0.74	.046	.003	0.25	.402	.634
8	-0.10	.799	.000	-0.54	.120	.161
9	0.09	.006	.807	0.16	.573	.538
10	0.21	.585	.465	0.05	.854	.678
11	-0.34	.365	.008	0.05	.855	.635
12	-0.52	.154	.000	0.13	.677	.104
13	-0.75	.069	.001	0.42	.077	.468
14	-0.35	.318	.000	-0.68	.011	.033
Overall p-value		.000			.004	

Software Key

1. word processing
2. spreadsheet analysis
3. spreadsheet design
4. database analysis
5. database design
6. Internet/info-communication services
7. accounting
8. financial planning
9. statistical
10. mathematical modelling
11. graphics
12. presentation
13. desktop publishing
14. expert systems and other high level decision making

The negative coefficient for the fourteenth variable signifies that educators believe expert systems and other high level decision making software skills to be more important to managers than to general business graduates. The homogeneity test shows that forty-four percent of educators believe that this skill is important to managers, while only twenty-five percent of educators believe this skill is important to general business graduates.

The three logit models below consider differences between university professors and college instructors as well as differences between managers of small and large companies in how they rate the importance of the software skills. The first model shows that university professors assign a higher rating to word processing skills than do college instructors. Ninety-one percent of university professors and seventy-six percent of college instructors rate this skill as being important to managers. Conversely, sixty percent of university professors and eighty-five percent of college instructors consider Internet/info-communication services to be an important skill to managers, indicating that college instructors deem this skill to be more important to managers than do university professors.

The second logit model shows a greater disparity between university professors and college instructors in their ratings of the importance of software skills to general business graduates. The tests show that university professors tend to attach more importance than do college instructors to general business graduates knowing word processing and financial planning skills, while the converse is true for accounting and presentation skills. Nevertheless, each of these four skills are generally considered by both groups to be somewhat or very important to the general business graduate. Although

there is some statistical evidence that significant differences exist for some of the other skills, an analysis of the percentages show no clear describable differences.

The last logit model signifies that managers of small companies agree with managers of large companies in the ratings of most software skills. However, mathematical modelling is considered by small company managers to be a more important skill than it is by managers of large companies. Even so, only thirty-two percent of small company managers, and sixteen percent of large company managers consider this skill to be somewhat or very important. Finally while there is some evidence from the logit p-values that word processing, financial planning, and desktop publishing is rated higher by small company managers than by large company managers - which are general skills needed by general managers of small companies - these findings are not supported by the tests for homogeneity. Similarly, the logit results indicate that large company managers tend to attach higher ratings to graphics skills than do small company managers, but again, this is not supported by the homogeneity test.

Table 16 - Logit Analysis of Software Ratings - Classified by Institution and Company Size

Software	**EDUCATORS SURVEY** **Software for Managers** Universities vs. Colleges			**EDUCATORS SURVEY** **Software for General Bus.** Universities vs. Colleges			**COMPANIES SURVEY** **Software for Managers** Small vs. Large		
	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value
1	-1.36	.016	.058	-2.09	.025	.021	1.50	.015	.133
2	-0.96	.208	.564	-0.28	.750	.016	-0.89	.269	.395
3	0.26	.595	.535	-0.87	.185	.877	-0.75	.333	.257
4	-0.31	.562	.980	0.24	.776	.540	0.78	.323	.357
5	-0.98	.134	.122	1.14	.213	.173	-0.26	.791	.454
6	1.62	.002	.033	0.27	.603	.920	0.59	.266	.219
7	1.07	.038	.724	3.06	.003	.012	-0.26	.680	.407
8	0.48	.458	.839	-1.67	.061	.006	1.08	.098	.832
9	-1.88	.003	.457	-1.49	.033	.329	-0.63	.258	.254
10	0.18	.717	.805	0.27	.698	.268	1.45	.022	.029
11	-0.49	.354	.894	-0.05	.928	.817	-1.39	.024	.201
12	1.11	.029	.384	1.91	.030	.054	-1.07	.118	.179
13	-0.16	.728	.501	0.11	.831	.043	1.58	.047	.204
14	-0.54	.234	.365	-1.18	.085	.921	-0.78	.236	.582
Overall p-value		.003			.000			.002	

Software Key

1. word processing
2. spreadsheet analysis
3. spreadsheet design
4. database analysis
5. database design
6. Internet/info-communication services
7. accounting
8. financial planning
9. statistical
10. mathematical modelling
11. graphics
12. presentation
13. desktop publishing
14. expert systems and other high level decision making

The previous two sections of this chapter sought to measure the degree of congruency between managers' and educators' perception of the importance of general business/managerial skills, computer knowledge concepts, and software skills to managers and general business students. The analyses show agreement between educators and managers and that most of the computer knowledge concepts and software skills are considered by both groups to be important to managers. The determination of this congruency is important in that it shows that educators and managers are on similar wavelengths when considering computing skills. Without this concordance, it is less likely that educators will be able to meet the computing needs of managers. Having determined that this congruency exists, the next two sections of this chapter will specifically examine how computers are being used in business schools and companies. The last section of this chapter will attempt to determine if business schools are meeting the computing needs of managers.

4.5 THE USE OF COMPUTERS IN BUSINESS SCHOOLS

4.5.1 Research Question Q6

How are computers used in business courses?

On page 74 of this chapter it was revealed that seventy-two percent of university professors and ninety-three percent of college instructors state that their students are required to take a computing course. Questions 3.2 and 3.5 of the educators survey asked if the knowledge concepts and software skills discussed earlier in this chapter are taught

in the computing course. Educators were also requested to list other courses where the knowledge concept or software skill is taught. The following table shows the percentage of the 110 educators who are aware that a particular knowledge concept is or is not taught in the business computing course. Moreover, respondents were also asked to list other courses where the concept is taught. The table below shows only those courses listed by two or more respondents. It is also important to note results from question 3.1 of the educators survey signify that thirty-one percent of respondents claim to teach a business computing course; hence, the percentages below must be considered in this light.

The table reveals that over fifty percent of respondents claim that knowledge of computing hardware and network/communications technologies are taught in a business computing course in their program. On the other hand, only one-third of instructors - many of whom are the business computing instructors themselves - maintain that knowledge of cost/benefit analysis of technology acquisition and ethics of information access and usage are taught in the business computing course. Moreover, almost half of educators are uncertain as to whether these concepts are taught in a business computing course. Similarly, although almost half of the educators claim that knowledge of management information systems is taught in a business computing course, most of the remaining half of educators are uncertain as to whether these concepts are taught. It must be noted that, as discussed on page 58, a large number of respondents are educators in quantitative disciplines, and this may result in a pro-computing bias in some of their responses. Thus, the actual percentage of educators who are aware of what is taught in business computing courses may be smaller than detailed above.

The table also reveals that a Management Information Systems course is the business non-computing course where computer related knowledge concepts are most likely to be taught. Moreover, cost/benefit analysis of technology acquisition is sometimes taught in accounting and/or finance courses. It should be noted though, that the frequencies are small and hence should be considered only as an indication of which courses might teach certain concepts.

Table 17 - Courses Where Knowledge Concepts are Taught

Concept	Are the knowledge concepts taught in a business computing course?			
	Yes	No	Unsure	Other Courses Where the Concept is Taught (course name and number of respondents)
1	33%	21%	46%	accounting (11), finance(7), man. sci. (3), MIS(3)
2	36	16	48	mktg(3), MIS (3), audit.(2), finance (2),org.beh.(2)
3	59	3	38	MIS (3)
4	53	13	34	MIS (3)
5	49	9	43	MIS (5)
6	43	10	47	MIS (6), accounting information systems (2)

Knowledge Concepts Key

1. cost/benefit analysis of technology acquisition
2. ethics of information access and usage
3. computing hardware
4. network/communication technologies
5. decision support systems design
6. transaction processing systems design

A similar listing for the teaching of software courses is shown in the table below. Here it is evident that a greater number of educators are aware of the teaching of software skills in business computing courses than of the teaching of knowledge concepts. Over two-thirds of educators claim that word processing, spreadsheet and database analysis and design, and accounting software skills are taught in a business computing course. Less than one-third of educators claim that knowledge of Internet/info-communication

services, mathematical modelling, and expert systems and other high level decision making software skills is taught in a business computing course. Furthermore, more than half of the respondents are unsure as to whether these latter two skills are taught in a business computing course.

Table 18 - Courses Where Software Skills are Utilized

Concept	Are the software skills utilized in a business computing course?			
	Yes	No	Unsure	Other Courses Where the Software is Utilized (course and number of respondents)
1	79%	7%	14%	bus. comm.(11), accounting (2), marketing (2)
2	78	4	18	accounting (6), finance (5), manage. science (6)
3	68	2	30	accounting (3), manage. science (3), finance (2)
4	66	4	29	accounting (3)
5	63	4	33	
6	30	25	46	
7	67	11	21	accounting (11)
8	38	20	42	finance (8)
9	52	17	31	stats/math(15), mktg(2), accounting(2), man.sci.(2)
10	18	28	54	manage. science (4), accounting (2), statistics (2)
11	56	12	32	business communications (5), manage. science (2)
12	44	21	35	business communications (6), marketing (2)
13	27	26	46	business communications (3)
14	15	34	51	

Software Key

1. word processing
2. spreadsheet analysis
3. spreadsheet design
4. database analysis
5. database design
6. Internet/info-communication services
7. accounting
8. financial planning
9. statistical
10. mathematical modelling
11. graphics
12. presentation
13. desktop publishing
14. expert systems and other high level decision making

The table also shows a large number of other courses that utilize the computer. Word processing, graphics, presentation software, desktop publishing software skills are utilized in business communication courses. Spreadsheet and database skills are mentioned as being utilized in accounting, finance and management science courses. Statistical software, financial software, and accounting software are of course used mostly in statistics, finance, and accounting courses. Marketing also appears to be a course where a wide number of software applications are used.

Question 5.1 of the educators survey asked respondents if students use the computer in any of their courses. Only sixteen percent of respondents stated that they don't use the computer at all, two percent stated that students only analyse distributed output, and eighty percent responded that students use the computer in their class. Another eight percent of respondents gave a number of miscellaneous answers including: "they are encouraged to use a computer", indicating that it is optional in some courses.

Nineteen educators claimed that students used computers in their accounting classes, ten said that students used computers in their statistics classes, ten in business communications, eight in marketing, six in finance, five in management science, three in organizational behaviour, three in policy, two in tax, and two instructors said that they have students use computers in their management information systems classes.

Results from question 5.2 of the educators survey show that twenty-six percent of educators state that students are not required to use the computer to complete their assignments. Of the seventy-four percent of educators who maintain that students do use a computer to complete their assignments, a wide range of computer uses is mentioned.

Eighteen educators claim that students use a word processor to write reports and business plans. Twelve instructors mentioned using spreadsheets in their courses, while several others were more specific in their description of spreadsheet usage, including: preparing budgets (3 respondents), payroll (3), graphics (1), and financial simulation (1). Four other educators mentioned other forms of simulation, including marketing and general business simulations. Accounting assignments using ACCPAC was mentioned by five instructors, and other uses, each mentioned three times or less, include: e-mail, cases management, taxation, and database usage. The above list does not include assignments found in business computing courses.

4.5.2 Research Question Q7

How do students learn application skills?

Question 5.3 of the instructors survey specifically asked educators about the use of computer lab time in their courses. Fifty-four percent of educators claim that students are expected to do the work on their own, whenever they can find a computer; eleven percent maintain that casual lab time is booked for students - with no instructor, lab instructor or TA available; twenty percent state that casual lab time is booked for the students with the instructor, lab instructor or TA available. There are no significant differences between university professors' and college instructors' responses for each of the above. However, forty-one percent of college instructors and only seventeen percent of university professors said that weekly labs are set for students. Although inadequacy of computing facilities is considered by both groups to be a problem, it does not appear to be the reason for this discrepancy. Results from question 6.9 of the educators survey

reveal that while sixty-one percent of college instructors claim that inadequacy of computer facilities has hindered the usage of computers in their classes, only fifty-four percent of university professors make the same claim.[4]

When asked in question 5.4 of the educators survey how students learn to use the computer, thirty-two replied that students are expected to learn the programs on their own; twenty-two percent claim that students buy a required or recommended tutorial/reference guide; thirty-five percent claim that in-class (as opposed to in-lab) demonstrations are given; forty percent signify that lab demonstrations are given; thirty seven maintain that class handouts are given; and twenty percent said that on-line tutorials are used.

Question 5.5 of the educators survey asked respondents whether they believe that when a computer is used in their courses, some theory tradeoff must occur to accommodate the time taken up by computer usage. Eleven percent replied that they believe a tradeoff does occur and hence they do not use a computer in their courses. Thirty-one percent state that a hands-on versus theory tradeoff would occur, but that it is worth it, so students do use the computer in their class. Forty percent maintain that a significant tradeoff does not occur, and students do use the computer in their class. And nine percent of respondents claim that a significant tradeoff would not occur, but they still do not have students use the computer in their course.

Finally, respondents were asked in question 5.6 of the educators survey whether they were aware of any studies that assess whether students benefit from using the

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[4] Percentages for this question and the next do not add to 100 as respondents were allowed to check more than one answer.

computer. Four percent of respondents stated that they are aware of studies done and that they show that the costs outweigh the benefits. Conversely, fourteen percent of respondents claim that studies show that the benefits of computer use outweighs the costs. Eighteen percent are unaware of any studies, but believe that the costs outweigh the benefits, while fifty-three percent are unaware of any studies but nevertheless take a contrary view.

4.6 THE USE OF COMPUTERS BY MANAGERS

4.6.1 Research Question Q8

What are the main software applications used by managers?

Question 1.8 of the companies survey asked respondents to estimate the percentage of managers in the company who engage in frequent hands-on use of computers - as opposed to delegating computer usage to subordinates. Approximately seventy percent of managers of both small and large companies estimate that at least sixty percent of the managers in their company frequently engage in hands-on use of the computer. Moreover, in small companies over sixty percent of respondents claim that more than eighty percent of managers use the computer. This high percentage is likely due to the many hats that a general manager of a small company must wear. Moreover, less than twenty percent of respondents claim that less than twenty percent of managers in their company frequently use computers. It is likely that the respondents are referring to themselves.

Table 19 - Managers' Estimates of the Percentage of Their Managers Who Frequently Use Computers

	Small Companies		Large Companies	
	Count	Percentage	Count	Percentage
0%	1	2	0	0
1% - 19%	2	4	1	4
20% - 39%	6	12	4	15
40% - 59%	6	12	3	11
60% - 79%	4	8	7	26
80% - 100%	33	63	12	44

In question 3.3 of the companies survey respondents were asked to list up to two products each of word processing, spreadsheet, database management, and Internet/telecommunications software, along with version numbers and system or platform if known. The table below clearly shows Microsoft's dominance in the three main business products. Microsoft Word and WordPerfect clearly dominate the word processing market, accounting for eighty-five percent of the word processing software used by companies. Other software listed by two or more respondents are shown below.

Microsoft has an even greater domination in the spreadsheet market, as evidenced by Microsoft's Excel being mentioned over fifty percent of the time. Lotus 1-2-3 is a distant second choice, securing only twenty-eight percent of the sample entries. And again, Microsoft Access is clearly the most widely used database management software, with Paradox and dBase securing the second and third spots for popularity.

The last section of the table shows the most common operating systems used. Frequencies were calculated from the listing of systems used with the word processing software. Most companies use the same system for word processing, spreadsheet and

database software. A count of the systems used with spreadsheet software show no significant difference from those used with the word processing software.

Table 20 - Software and Platforms Used in Companies

Word Processing Software			Spreadsheet Software		
Product	Vers.	Count	Product	Vers.	Count
Microsoft Word	7	3	Microsoft Excel	7	3
Microsoft Word	6	22	Microsoft Excel	6	3
Microsoft Word	5	3	Microsoft Excel	5	17
Microsoft Word	4	1	Microsoft Excel	4	4
Microsoft Word	Unspec.	9	Microsoft Excel	Unspec.	12
WordPerfect	6	15	Lotus 1-2-3	5	7
WordPerfect	5	13	Lotus 1-2-3	Unspec.	14
WordPerfect	Mac	1	Quattro Pro	6	2
WordPerfect	Unspec.	6	Quattro Pro	Unspec.	2
Microsoft Works		4	Microsoft Works		2
Claris Works		2	Claris Works		5
AmiPro/Word Pro		2	Miscellaneous (one of each)		5
CIM Data		2			
Miscellaneous (one of each)		3			
Database Management Software			**System / Platform**		
Product	Vers.	Count			Count
Microsoft Access	2	8	Windows 95		8
Microsoft Access	Unspec.	8	Windows 3.11		10
Paradox	5	2	Windows 3.1		9
Paradox	4	3	Windows - Unspecified		11
Paradox	3	1	DOS		10
Paradox	Unspec.	1	Macintosh		5
dBase	IV	3	Miscellaneous (one of each)		4
dBase	III	1			
dBase	Unspec.	1			
Claris Works		3			
FileMaker Pro		2			
CIM Data		2			
Custom - In house		4			
Miscellaneous		18			

Clearly Microsoft products dominate here as well. Sixty-seven percent of the systems mentioned were versions of Windows. And if DOS is included, the percentage rises to eighty-four percent. Macintosh systems were mentioned only nine percent of the time, and miscellaneous - mostly non-PC based systems - were mentioned four times.

Question 3.3 of the companies survey also asked respondents to list software used for Internet access and telecommunications. A large number of products were mentioned with only Netscape - mentioned fifteen times - being listed more than twice.

4.6.2 Research Question Q9

For what purposes are software applications used by managers?

Question 3.4 of the companies survey asked respondents to indicate, using a four point likert scale (1=very unimportant, 4=very important), how important it is that managers in the company be proficient in hands-on usage of certain software. The table below shows the median ratings and subsequent rankings (based on the variables means) of the skills in each category. Thus of the spreadsheet skills, financial reporting and monitoring is considered to be the most important skill, followed by statistical analysis. Graphical presentations and other modelling or simulation skills are considered to be less important than the first two. The median ratings of three for the first two skills indicate that at least half of respondents believe that financial reporting and statistical analysis skills are important. On the other hand, at least half of the respondents believe that graphical presentations and other spreadsheet modelling skills are unimportant.

Considering the database skills, routine reporting is considered by managers of both small and large companies to be the most important database skill. There appears to be some discrepancy in the ratings of the other skills. In particular, managers of small companies consider interactive transaction processing to be a more important skill (with a median rating of three) than do managers of large companies (who gave a median rating

of two). Conversely, managers of small companies appear to value ad hoc reports and querying less than do managers of larger companies.

The rankings for the Internet/telecommunications skills show that electronic communication and e-mail are considered to be important to managers of both small and large companies, but the other skills are not considered to be important as shown by their low medians of one or two. Moreover, managers of larger companies generally consider "conducting business" and "remote applications" usage of telecommunication software to be very unimportant.

Table 21 - Importance of Software Skills to Managers

Skill	COMPANIES SURVEY Importance Ratings of Spreadsheet Skills						COMPANIES SURVEY Importance Ratings of Database Skills						COMPANIES SURVEY Importance Ratings of Internet/telecomm. Skills					
	All		Small		Large		All		Small		Large		All		Small		Large	
	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank	Med.	Rank
1	3	1	3	1	3	1	2	3	3	2	2	4	3	1	3	1	3	1
2	2	3	2	4	2	3	2	4	2	3	2	5	2	2	2	3	2	2
3	3	2	3	2	3	2	3	2	2	4	3	1	2	3	2	2	2	3
4	2	4	2	3	2	4	3	1	3	1	3	2	2	4	2	3	1	5
5	--	--	--	--	--	--	2	5	2	5	2	3	2	5	2	5	1	4
	Spreadsheet Skills Key 1. financial reporting 2. graphical presentations 3. statistical analysis 4. other modelling or sim.						Database Skills Key 1. interactive transact. proc. 2. historical batch records 3. ad hoc reports and query 4. routine reporting 5. advanced data analysis						Internet/telecom. Skills Key 1. electronic communication 2. info. gathering/research 3. making info. available 4. conducting business 5. remote applications					

Further analysis of this question was done using a series of binary logit regression models in order to determine if there are significant difference between the ratings given

by managers of small companies and those given by managers of large companies. Validation of the logit model was done using a series of chi-squared tests for homogeneity.

The p-values from the first logit model shows that there are no significant differences between the ratings given by the two groups.

The overall p-value of the second model shows that there are significant differences in the ratings given by the two groups. In particular the small p-value of 0.014 for skill # 2 - historical batch record keeping, along with its positive coefficient indicates that managers of small companies tend to rate this skill higher in importance than do managers of larger companies. The test for homogeneity shows that forty-four percent of small company companies consider this skill to be important or very important, whereas only nineteen percent of large company managers give similar ratings. The low p-value for the third skill - ad hoc reports and querying, along with the negative coefficient indicates that managers of large companies value this skill more than do managers of small companies. However this contradicts the conclusion reached by analysing the medians table. Moreover, the test for homogeneity shows no significance difference between the ratings of the two groups. Therefore the evidence is inconclusive.

The overall p-value for the third logit model shows no significant difference is the ratings of Internet/telecommunications skills given by the two groups of managers. The fourth skill - conducting business does have a marginally positive coefficient, suggesting that managers of small companies tend to consider this skill to be more important than do managers of larger companies. This is validated by the test for homogeneity and agrees

with the conclusion reached in studying the medians. However, this skill is still considered to be unimportant or very unimportant by most managers.

Table 22 - Logit Analysis of Software Skills Ratings - Classified by Company Size

Skill	**COMPANIES SURVEY** **Spreadsheet Skills** Small vs. Large			**COMPANIES SURVEY** **Database Skills** Small vs. Large			**COMPANIES SURVEY** **Internet/telecomm. Skills** Small vs. Large		
	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value	Logit Coeff.	Logit p-value	$\chi 2$ p-value
1	0.20	.546	.928	-.055	.335	.149	-0.14	.662	.869
2	-0.55	.173	.222	1.73	.014	.071	-0.25	.644	.265
3	-0.17	.659	.439	-2.89	.021	.427	-0.07	.896	.705
4	0.01	.969	.411	2.08	.084	.101	0.79	.049	.072
5	----	----	----	-0.05	.926	.874	-0.06	.908	.450
Overall p-value	.573			.005			.322		
	Spreadsheet Skills Key 1. financial reporting 2. graphical presentations 3. statistical analysis 4. other modelling or sim.			Database Skills Key 1. interactive transact. proc. 2. historical batch records 3. ad hoc reports and query 4. routine reporting 5. advanced data analysis			Internet/telecom. Skills Key 1. electronic communication 2. info. gathering/research 3. making info. available 4. conducting business 5. remote applications		

4.6.3 Research Question Q10

How do existing managers learn to use the computer?

Question 4.4 of the companies survey asked respondents to rank the methods of learning new software used by managers in the company, where 1 = most commonly used method. The p-value for the Friedman's test for all eighty-two managers shows that there are significant differences between the rankings of the learning methods. Self-instruction is the most commonly used method of learning new software, following by in-

house training or seminars, off-site training or seminars, and finally video based instruction. The implications of these findings suggest that colleges and universities may have little influence in training current managers, which would fall under the classification of off-site training. Hence, emphasis should be put on training present students to be future managers, even though efforts to train managers through community education courses should not be ruled out.

Table 23 - Methods of Learning Software - Rankings by Managers

Learning Method	All Companies n = 82	Small Companies n = 53	Large Companies n = 29
self instruction	1	1	1
in-house training/seminar	2	2	2
off-site training/seminar	3	3	3
video based instruction	4	4	4
Friedman's p-value	.000	.000	.000

4.7 MEETING THE COMPUTING NEEDS OF MANAGERS

4.7.1 Research Question Q11

Is the teaching of computing concepts and software usage in business schools deemed adequate by managers?

Perhaps the most important question in the companies survey is 4.1 which asks managers if colleges and universities adequately prepare future managers with the computing skills and knowledge base that they need to be productive managers. Only forty-seven of the eighty-two respondents answered the question, indicating that many

managers know little of the curriculum in business schools. Of those that responded, seventy percent answered in the affirmative, while thirty percent (thirteen respondents) indicated a negative response. Comments from these people appear below:

- Knowing terms is not enough. What's it used for, and why?
- No management skills in most technical programs, where most managers of small businesses come from
- Not enough hands on, real life experience and knowledge
- Most people applying for positions with our firm are trained in only one type of software - i.e. accounting, computer graphics or word processing. They rarely have a general knowledge of all.
- Lack practical application of computer skills
- May know how to operate the equipment, but not sure of the end product.
- School is a state experience. We perform a lot of 'creative' work. School can not teach creativity. It can not simulate our work environment.
- I took programming courses in college. They're useless. Application courses - i.e. windows, DOS, are more appropriate. Norton Utilities is excellent as well.
- They need more practical experience in the workforce.
- More emphasis needs to be placed on understanding the concepts; not just knowing a specific product.

The recurring theme in the above comments is that knowledge and skill is not enough. Business schools need to equip future managers with a skill set that allows them to function better in real business settings. Moreover, putting students in practical situations where they can apply the skills that they learn will likely better meet the needs of future managers.

These last findings are important in that they put this study into perspective. Although it has been shown in the above sections that instructors and educators generally agree as to what computing skills are important for future managers, and furthermore, that business schools are teaching these skills, much more emphasis needs to be put on using the skills in practical or real business environments.

CHAPTER FIVE

SUMMARY AND RECOMMENDATIONS

5.1 SUMMARY AND CONCLUSIONS

The first two operational research questions were concerned with the training of managers in business schools. Educators believe that a significant number of their graduates become managers within five years. Moreover, the managers of most companies maintain that some of their peers are graduates of business schools.

The results of the Friedman's and Spearman's rank correlation tests show that educators and managers generally agree as to what are the most important skills needed by managers. Computing and technical skills were not considered by either group to be as important as problem solving and communication skills.

The third, fourth, and fifth operational research questions attempted to determine the degree of concordance between managers' and educators' ratings of the importance of computing knowledge concepts and software skills. Logit and homogeneity tests found, in general, that there was agreement between the two groups as to the importance of knowledge concepts, however educators tended to assign higher ratings of importance to many of the software skills as compared to the ratings assigned by managers. Conversely, managers tended to attach higher levels of importance to proficiency in accounting software than did educators.

In general, there tended to be strong congruence between the ratings assigned by managers of small companies and the ratings assigned by managers of larger companies. Similarly, for many knowledge concepts and software skills there was little difference between the ratings given by university professors and those given by college instructors. There was some evidence, however, that college instructors and managers differ little in their ratings, whereas greater differences exist between the ratings given by university educators and managers. This finding supports the comments made by the many college and university educators who claimed that college graduates are more likely to learn practical skills that are applicable to the workplace than are university graduates who are more likely to be strong in the theoretical business skills.

The sixth and seventh operational research questions attempted to ascertain how computers are used in business courses. The research evidence indicates that the majority of educators deem computer usage to be of great importance in their programs, and many integrate the computer into their courses. Most of these courses are quantitative in nature, with strong computer usage occurring in MIS, accounting, finance, and management science courses. However several instructors claimed to use the computer in business communication and marketing research courses.

Most students are required to learn to use the computer on their own. Inadequacy of computer resources and facilities appears to be a prime concern of many programs. Both universities and colleges suffer from this problem.

The eighth, ninth, and tenth operational questions explored the use of computers by managers. It was found that almost all managers engage in hands-on use of the computer. However the evidence indicates that most of computer usage is for operational

tasks such as financial reporting, monitoring, communicating, and information storage and retrieval. Few managers considered the higher level analytical skills such as modelling, simulation, and advanced data analysis to be of much importance. Also, most managers attach little importance to conducting business over the Internet.

In-house and self instruction appear to be the most common methods that managers use to learn new software. Microsoft products are the most commonly used products in most companies. In particular, Microsoft Excel and Access are the most widely used spreadsheet and database programs in the central Alberta region, and Microsoft Word is even used by more companies than is WordPerfect. Moreover, managers indicated that for most types of applications companies prefer new managers to be knowledgeable of specific software products such as Microsoft Word.

The eleventh operational question examined the issue of whether business schools are meeting the computer training needs of managers. Most respondents either replied that business schools do meet managers' computer training needs, or they failed to respond, indicating their ignorance of the business curriculum and the use of computers in the curriculum. Of those who replied that business schools are not meeting managers' computer training needs, most indicated that schools need to have a more practical focus in the skills and knowledge concepts that they teach.

5.2 IMPORTANCE OF THE RESEARCH

The findings from the first two research questions indicate that business schools do train managers, and hence future managers' needs - both technical and non-technical - should be considered in the designing of business curricula. Moreover, there is some indication that university educators need to be more in-tune with the needs and beliefs of managers.

The results from the third, fourth, and fifth research questions indicate that there is generally a concordance between which software skills and knowledge concepts are considered important by managers, and which are considered important by educators. However, educators may wish to consider teaching more accounting software skills if they intend to meet the needs of managers.

The results of the sixth and seventh research questions indicate that educators believe that the teaching of, and use of computing skills in the classroom is important, but lack of adequate computing resources and facilities hinders the use of computers in business programs.

The results from the eighth, ninth, and tenth research questions show that existing managers tend not to obtain training in computer usage through business schools. If business schools wish to train more managers in computer usage they may need to make greater efforts to train managers in the managers' building rather than requiring managers to attend on-campus courses. Moreover, the results also indicate that most managers prefer that future managers know how to use specific software products. Educators may

need to keep a greater contact with companies if they intend to meet the computing needs of managers.

Finally, the last research question indicates that educators should consider the age-old problem of making their courses more practical to those in the workforce.

In summary, the research indicates that the three-way manager-educator-computer linkage is a strong one and must be considered in the designing of business curricula. Moreover, with the increased usage of computers by managers, it is likely that this connection will become even more important in the future.

5.3 RECOMMENDATIONS

Four recommendations come out of this study:

(1) The literature review suggests that computers are rapidly infiltrating society and making increasing demands on managers. This rapid change may result in managers demanding that business schools increase the usage of computers in their courses. Educators should keep close contact with managers, to determine their specific and general business needs.

(2) Similar studies to this one need to be frequently undertaken. Moreover, a larger sample size of managers would allow a more reliable determination of what are the needs of managers.

(3) This study primarily focused on determining that there exists a three-way link between managers, educators, and computers. But further data needs to be collected in order to determine if managers needs are being met. A survey of students in business programs who are also managers of companies would be useful. Students of MBA and executive MBA programs are possible candidates for this study.

(4) A long-term study that follows business graduates through several years of job experience should to be undertaken in order to better determine if business schools are meeting the needs of their graduates - many of which eventually become managers.

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APPENDIX

April 19, 1995

Dear Business Chairperson/Coordinator:

A few days ago I contacted you or someone in your department regarding a survey that Red Deer College and the University of Alberta is conducting, regarding how computers are being used in Business Administration and Commerce programs. (Full details of this survey are included in the cover letter accompanying the questionnaire.)

A good response rate is vital if useful information is to be gleaned from this study. Please assist me by distributing the questionnaire to each of your full-time business instructors, and encouraging them to respond. You may also include part-time or sessional instructors if they teach a minimum of three sections per year. Please note that this survey is to be sent to all Business Administration and Commerce instructors, not just those who teach a Business Computing course or use the computer in their courses.

The results of the survey will be sent to you in the fall when the project is complete.

Thank you for your assistance with this project. I will be sending a follow-up reminder to all instructors sometime in the next month. If you have any further questions, please call be at 342-3274 (Office) or 342-0378 (Home).

Doug MacDormand

Business Administration and Commerce
Red Deer College
Box 5005
Red Deer, AB. T4N 5H5

April 19, 1995

Dear Colleague:

As a Business Computing and Statistics instructor at Red Deer College I have seen considerable change in the past few years in the way Business courses are taught. In particular, due to advances of computer technology and computing demands in the workplace, computer usage in the Business classroom has become an important issue. Are we meeting the demands of a fast changing environment? Are we using computers to their full advantage, or are we hopping on the technology bandwagon when we should in fact be taking a closer look at the whole issue?

Red Deer College and the University of Alberta have commissioned me to do a study focussing on how computers are being used in Business programs. The following questionnaire has been sent to <u>all</u> full-time Business Administration and Commerce instructors at Alberta's Universities and Colleges. (This survey does <u>not</u> just include those instructors who teach or use the computer in their courses.) The information received from this survey will then be compared to results from another survey sent to numerous Alberta businesses, which asks them about their computing needs and whether our Business schools are preparing their future employees with the necessary computing skills that they need.

Please complete this questionnaire **by June 1st**. Although the questionnaire looks lengthy, most of the questions require check mark or rating responses. It should take you only fifteen to twenty minutes to complete. A return addressed envelope is included. Simply drop the completed questionnaire in the government courier mailbag at your institution.

Results of the survey will be forwarded to each institution upon completion of the report during the fall of '95.

If you have an questions regarding this survey please contact me at 342-3274 (Office) or 342-0378 (Home).

Thank you for your cooperation in this matter,

Doug MacDormand

Business Administration and Commerce
Red Deer College
Box 5005 Red Deer, AB. T4N 5H5

May 24, 1995

Dear Business Chairperson/Coordinator:

Last month I sent you a package of questionnaires to be distributed to instructors in your business program. Thank you for your cooperation. To date I have received close to one-hundred completed questionnaires and am anticipating a few more in the next few weeks.

I would greatly appreciate it if you would send out this reminder notice to those instructors that you sent the original survey to. This includes your full-time business instructors, and perhaps part-time or sessional instructors if they teach a minimum of three sections per year. The survey was sent to all Business Administration and Commerce instructors, not just those who teach a Business Computing course or use the computer in their courses.

Thank you for your assistance with this project. If you have any further questions, please call be at 342-3274 (Office) or 342-0378 (Home) or email me at DMACDORMAND@RDC.AB.CA

Doug MacDormand

Business Administration and Commerce
Red Deer College

May I please speak to the human resources or general manager?

Hi. My name is XXX, I am working on a thesis survey conducted by Doug MacDormand, a business instructor at Red Deer College.

Red Deer College, in conjunction with the University of Alberta, is looking at how managers are using computers in Alberta Businesses and whether colleges and universities are teaching graduates the necessary business skills needed in today's market.

We would like your help in our study. I would like to fax to you or another manager in your company a four page questionnaire that will take 15 - 20 minutes to fill out; and we would like it returned within 2 working days. All the information you give us will be kept strictly confidential. Would you be willing to participate in our survey?

[As needed] Does your company have a [marketing, etc.] manager that I may talk to?

Computers in the Classroom

A Survey of Business Instructors at Alberta's Universities and Colleges

This questionnaire is comprised of several parts. It is important that you answer all applicable questions from each section.

For purposes of this questionnaire, please consider the term Business Program to mean Business Administration and/or Commerce departments (which is the typical designation in Colleges and Trade Institutes) or the Business Faculty as a whole (as in the case of the universities). If you are part of a larger Commerce or Management faculty (as in universities) then the members of your specific department (eg. Marketing) will be referred to as the colleagues in your main discipline.

Section 1 - Demographics ==========

The following questions are asked for categorization purposes only. Your anonymity is guaranteed.

1.1 In what type of institution do you teach?

_____ University
_____ College/Technical Institute

1.2 In what type of Business Program do you teach?

_____ University/University Transfer
_____ Business Diploma/Certificate
_____ Both

1.3 What is your discipline? (If you teach courses in more than one of the following disciplines please rank them, where 1 = main discipline. Rank as many as apply.)

_____ Accounting
_____ Finance
_____ Management Science / Statistics / Business Math
_____ Business Computing
_____ Human Resources / Industrial Relations
_____ Organizational Behaviour/ Organizational Analysis
_____ Business Law
_____ Marketing
_____ Business Economics
_____ Business Policy / General Management
_____ Business Communications
_____ Other _____

Please note that the discipline that you checked or ranked first will be termed your 'main discipline' for the rest of this questionnaire.

Section 2 - Necessary Skills for Business Graduates

For purposes of this section of the questionnaire, consider a manager to be one who is responsible for the planning, organizing, leading, and controlling of the entire organization and/or the sub-systems of the organization. For small firms the manager(s) may be one or more chief decision makers of the firm; for larger firms consider those in middle and upper managerial positions, as opposed to lower level supervisors.

2.1 Consider each of the following Business skills. First rank the top four skills (1=most important) that you believe are most important for a general Business student graduating from your program. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rank the top four skills needed of a graduating Business student specializing in your main discipline. Finally, rank the top four skills needed by managers.

	General Bus. Student	Your discipline	Manager
planning	____	____	____
organizing	____	____	____
problem solving/creativity	____	____	____
team skills	____	____	____
leadership	____	____	____
supervision	____	____	____
oral communication	____	____	____
written communication	____	____	____
information extraction/analysis	____	____	____
computer usage	____	____	____
theoretical knowledge	____	____	____
technical skills	____	____	____
customer/external relations	____	____	____
other _____	____	____	____

2.2 What is your estimate of the percentage of students graduating from your institution who will attain managerial positions in their next five years? (Colleges/Technical Institutes: do not consider University Transfer students in your estimate.)

_____

2.3 What is your estimate of the percentage of students specializing in your main discipline and graduating from Business schools who will attain managerial positions in the next five years? (Colleges/Technical Institutes: do not consider University Transfer students in your estimate.)

_____

2.4 What do you perceive to be the main differences between a University Business degree graduate and a College/Technical Institute Business diploma graduate in terms of the types of jobs they will get immediately upon graduation?

Section 3 - The Importance of Specific Computing Skills/Concepts ==========

3.1 For each of the following theory concepts please rate how important it is that a general Business student graduating from your Program be **knowledgable about the subject matter**. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rate the importance of this knowledge for graduating Business students specializing in your main discipline. Finally, rate the importance of this knowledge for managers.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the theory concept.

	General Bus. Student	Your discipline	Manager
cost/benefit analysis of technology acquisition	____	____	____
ethics of information access and usage	____	____	____
computing hardware	____	____	____
network/communication technologies	____	____	____
management information systems			
decision support systems design	____	____	____
transaction process. sys. design	____	____	____
other important computing concepts			
_____	____	____	____

3.2 For each of the following **theory concepts** please indicate whether the concept is taught in a Business computing course and/or in some other course(s).

	Taught in Computing Course? Yes	No	Don't Know	Taught in Other Courses? (Please indicate courses)
cost/benefit analysis of technology acquisition	____	____	____	_____
ethics of information access and usage	____	____	____	_____
computing hardware	____	____	____	_____
network/communication technologies	____	____	____	_____
management information systems				
decision support systems design	____	____	____	_____
transaction process. sys. design	____	____	____	_____
other important computing concepts				
_____	____	____	____	_____

3.3 If any of the above theory concepts are taught in either Business Computing or other courses, but the coverage is inadequate, please list the concept and briefly describe the inadequacy.

_____
_____
_____
_____
_____
_____
_____
_____

3.4 Please rate how important it is that a general Business student graduating from your Program be proficient in the following software. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rate the importance of the software for graduating Business students specializing in your main discipline. Finally, rate the importance of the software for managers.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software.

Software	General Bus. Student	Your discipline	Manager
word processing	____	____	____
spreadsheet analysis	____	____	____
spreadsheet design	____	____	____
database analysis	____	____	____
database design	____	____	____
Internet/info-communication services	____	____	____
accounting	____	____	____
financial planning	____	____	____
statistical	____	____	____
mathematical modelling	____	____	____
graphics	____	____	____
presentation	____	____	____
desktop publishing	____	____	____
expert systems and other high level decision making software	____	____	____
other important computing software	____	____	____
_____	____	____	____

3.5 For each of the following **software** please indicate whether the software is utilized in a Business computing course and/or in some other course(s).

Software	Utilized in Computing Course? Yes	No	Don't Know	Utilized in Other Courses? (Please indicate courses)
word processing	____	____	____	_____
spreadsheet analysis	____	____	____	_____
spreadsheet design	____	____	____	_____
database analysis	____	____	____	_____
database design	____	____	____	_____
Internet/info-communication services	____	____	____	_____
accounting	____	____	____	_____
financial planning	____	____	____	_____
statistical	____	____	____	_____
mathematical modelling	____	____	____	_____
graphics	____	____	____	_____
presentation	____	____	____	_____
desktop publishing	____	____	____	_____
expert systems and other high level decision making software	____	____	____	_____
other important computing software	____	____	____	_____
_____	____	____	____	_____

3.6 If any of the above software is utilized in either Business computing or other courses, but the utilization is inadequate, please list the software and briefly describe the inadequacy.

_____
_____
_____

Section 4 - The Business Computing Course ==========

4.1 SHOULD students in Business Programs be required to take a computing course? (Colleges/Technical Institutes: do not consider University Transfer students.) (Check one only)

_____ Yes
_____ Yes - but only if they haven't acquired the skills/theory elsewhere
_____ No
_____ Other _____

If you answered NO to the above question please skip to question 4.5

4.2 In which year of the Program should a Business student take their first computing course?

_____ First year
_____ Second year
_____ Third or Fourth

4.3 Is one (i.e. equivalent to a single term/half year) introductory computing course sufficient to equip the Business student with the necessary hands-on computing skills that they need for other Business courses?

_____ Yes
_____ No - Please elaborate _____
_____
_____
_____

4.4 Do University/University Transfer students have different computing needs than Business Admin. Diploma/Certificate students?

_____ No
_____ Yes - Please elaborate _____
_____
_____
_____

4.5 ARE students in your Business Program required to take a computing course? (Colleges/Technical Institutes: do not consider University Transfer students.)

_____ Yes _____ No

4.6 Does an instructor in your Business Program teach a Business Computing course? (This does not include discipline specific courses where computer usage is secondary to subject content. eg. an Accounting course that uses a spreadsheet or GL program. This also does not include a Computing or Business Computing course which is taught by instructors from a different program (such as Computing Science).)

_____ Yes _____ No

4.7 Do you teach a Business computing course?

_____ Yes _____ No

Section 5 - The Role of Computers in Your Courses

5.1 Do students use the computer in any of your courses?

_____ Not at all

Why not? _____

_____

_____ Students only analyze distributed output

_____ Yes, students acquire hands-on experience in my courses

Which courses? _____

_____

_____ Other _____

Please skip to question 5.5 this section if you did not answer Yes to the question above.

5.2 Are students given assignment(s) for grade requiring the use of the computer?

_____ No

_____ Yes - Please give a brief description of assignment(s) including course name, software program, and assignment weighting(s)

_____

_____

_____

_____

_____

_____

_____

5.3 Do students have lab time to use the computer? (Check as many as apply)

_____ They are expected to do the work on their own, whenever they can find a computer

_____ Casual lab time is booked for the students - with no instructor, lab instructor or TA available

_____ Casual lab time is booked for the students - with the instructor, lab instructor or TA available

_____ Weekly labs (as designated in the calendar) are set for students

_____ Other _____

5.4 How do students learn to use the computer? (Check as many as apply)

_____ They are expected to learn the program(s) on their own

_____ Students buy a required or recommended tutorial/reference guide

_____ In-class (as opposed to in-lab) demonstrations are given

_____ Lab demonstrations are given

_____ Class handouts are given

_____ On-line tutorials are used

_____ Other _____

5.5 Do you believe that there is (or would be) a 'hands-on versus theory' tradeoff if computers are taught in your course(s) - (where 'theory' refers to theory concepts of your main discipline - eg. accounting theory)?

_____ Yes [students do not use the computer in my course(s)]

_____ Yes [but the tradeoff is worth it; students do use the computer]

_____ No or not significant [students do use the computer]

_____ No or not significant [students do not need to use the computer in my course(s)]

_____ Other _____

5.6 Are you aware of any studies that assess whether students benefit from using the computer in courses of your main discipline?

_____ Yes [they show that the costs outweigh the benefits]

_____ Yes [they show that the benefits outweigh the costs]

_____ No [but I believe that the costs outweigh the benefits]

_____ No [but I believe that the benefits outweigh the costs]

_____ Other _____

[If you wish to name or comment on specific studies, please do so in the Comments section at the end]

Section 6 - The Role of Computers in Your Program ==========

6.1 How would you rate your own level of mastery of computer usage? (Please circle the appropriate number. Do not choose a position between two numbers - such as 2.5)

1	2	3	4
none	slight	moderate	extensive

6.2 How would you rate the average level of mastery of computers usage of other colleagues of your main discipline? (Leave all numbers uncircled if you are unaware of their level of mastery.)

1	2	3	4
none	slight	moderate	extensive

6.3 How would you rate the average level of mastery of computers usage of other colleagues in your Business Program? (Leave all numbers uncircled if you are unaware of their level of mastery.)

1	2	3	4
none	slight	moderate	extensive

6.4 Does your Business Program have a specific plan for the integration of computers into the Business curriculum?

_____ Yes _____ No

6.5 At what rate, during the past three years, has computer usage been integrated into Business courses in your program?

1	2	3	4
very slowly or not at all	slowly	quickly	very quickly

6.6 At what rate, during the next three years, should computer usage be integrated into the Business courses in your program?

1	2	3	4
very slowly or not at all	slowly	quickly	very quickly

6.7 At what rate, during the past three years, has computer usage been integrated into the Business courses of your main discipline?

1	2	3	4
very slowly or not at all	slowly	quickly	very quickly

6.8 At what rate, during the next three years, should computer usage be integrated into the Business courses in your main discipline?

1	2	3	4
very slowly or not at all	slowly	quickly	very quickly

6.9 Has inadequacy of computing facilities hindered the usage of computers in your classes?

_____ Yes _____ No

If Yes, please elaborate _____

_____

_____

_____

_____

6.10 Has your Business Program, in the last three years, conducted an employer survey to assess the computing needs of the business community?

_____ Yes _____ No

If Yes, do you have any comments on the major findings?

_____

_____

_____

Do you have any last comments on the role of computers and information technology in the Business Program?

_____

_____

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____

Thank you for input. Please return your completed questionnaire via government courier to:

Doug MacDormand
Business Administration
and Commerce Program
Red Deer College
Box 5005 Red Deer
T4N 5H5

Managerial Usage of Computers

A Survey of Alberta Businesses

This questionnaire comprises several parts. Answer all applicable questions from each section. Please do not ask another person to fill out this questionnaire. Although some other persons may use the computer more than you do, it is important that you, as a manager or business professional, complete this questionnaire. Upon completing this questionnaire, please fax the results to:

Doug MacDormand
Business Admin. and Commerce
Red Deer College T4N 5H5
Fax #: (403) 340 8940

****Note** For purposes of this questionnaire consider a manager to be one who is responsible for the planning, organizing, leading, and controlling of the entire organization and/or a division/department/unit/section.**

Names by which a manager may also be known include the following: employer, executive, administrator, boss, director, foreman, overseer, supervisor, controller, CEO, CIO, CFO, etc.

When considering managers please also consider business professionals, such as accountants, who also engage in decision making in your firm.

Section 1 - Demographics ==========

The following questions are asked for categorization purposes and help us keep track of who has responded. In the final writeup no respondent will be identified with any particular answers.

1.1 What is your firm's name? _____

1.2 What is your job title? _____

1.3 In which functional business area are you a manager in your firm? (Check one only.) Note: smaller companies may not have separate managers for the functional areas listed below, and so should check General Manager.)

- _____ General Manager
- _____ Accounting / Finance
- _____ Marketing / Sales
- _____ Manufacturing (eg. Processing or Plant manager)
- _____ Information Systems / Computing Services
- _____ Human Resources
- _____ other _____

1.4 In which city/area are you located? _____ Red Deer _____ Edmonton _____ Calgary

1.5 In which industrial sector is your firm best placed? (Check one only.)

- _____ Agriculture
- _____ Natural Resources
- _____ Manufacturing
- _____ Construction
- _____ Transportation
- _____ Communication and Other Utilities
- _____ Retail and Wholesale Trade
- _____ Finance and Insurance
- _____ Other Business services
- _____ Government, Health, Education, Community Services
- _____ other _____

1.6 Approximately how many full-time employees are employed in your firm? _____

1.7 Approximately how many of these employees are managers in the firm? (See the note at the top of this page for a definition of manager / business professional.) _____

1.8 Approximately what percentage of these managers engage in frequent hands-on use of computers (as opposed to delegating computer usage to a subordinate)? _____

1.9 Approximately what percentage of these managers are graduates of a business program (i.e. hold a business diploma or degree)? _____

Section 2 - Necessary Skills for Managers ==========

2.1 Below are listed several business skills. Rank the top four skills (1=most important) that you believe are most important for a manager in your functional business area in the firm. (Note: "in your functional area" refers to the area that you checked in question 1.3 on the first page.)

planning	____	written communication	____
organizing	____	information extraction/analysis	____
problem solving/creativity	____	computer usage	____
team skills	____	theoretical knowledge	____
leadership	____	technical skills	____
supervision	____	customer/external relations	____
oral communication	____	other _____	____

Section 3 - The Importance of Specific Computing Skills/Concepts ==========

3.1 For each of the following knowledge areas please rate how important it is that a manager in your area in the firm be **knowledgable about the subject matter**.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the knowledge area..

cost/benefit analysis of technology acquisition	____
ethics of information access and usage	____
computing hardware	____
network/communication technologies	____
management information systems	
decision support systems design	____
transaction process. sys. design	____
other important computing concepts	
(please list) _____	____

3.2 Please rate how important it is that a manager in your area in the firm be **proficient in hands-on use of the following software**.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software.

word processing	____
spreadsheet analysis	____
spreadsheet design	____
database analysis	____
database design	____
Internet/info-communication services	____
accounting	____
financial planning	____
statistical analysis	____
mathematical modelling	____
graphics	____
presentation	____
desktop publishing	____
expert systems and other high level	
decision making software	____
other important software	
(please list) _____	____

3.3 For each of the following **software** types, list up to two packages/products used by managers in your area in the firm. Also include the version numbers, and system/platform if known. (Eg. WordPerfect 6.1 for Windows 95) Leave the spaces blank if the software is not used by managers in your area in the firm.

	Package/Product	Version	System
word processing	_____	____	_____
	_____	____	_____
spreadsheet	_____	____	_____
	_____	____	_____
database	_____	____	_____
	_____	____	_____
Internet/telecomm.	_____	____	_____
	_____	____	_____

3.4 Below are some of the possible uses of some of the software applications listed above. Please rate how important it is that a manager in your area in the firm be **proficient in hands-on usage of the software in this fashion.**

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software usage.

spreadsheet software
- financial reporting and monitoring ____
- graphical presentations ____
- statistical analysis ____
- other modelling or simulation uses ____
- other _____ ____

database software
- interactive transaction processing ____
- historical batch record keeping ____
- ad hoc reporting and querying ____
- routine reporting and summarizing ____
- advanced data analysis (eg. data synthesis) ____
- other _____ ____

Internet / telecommunications software
- electronic communications (E-mail, teleconferencing) ____
- information gathering / research ____
- making available information about your firm ____
- conducting business (selling your product / services) ____
- remote application usage (telnetting) ____
- other _____ ____

3.5 Indicate any other specialized application software used by managers in your area in the firm. (Eg. accounting, statistical, project management, etc.) Also, briefly describe how this software is used.

Software	Usage
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Section 4 - Educating Present and Future Managers ==========

An important issue addressed by this survey concerns how well business schools equip future managers with the computing skills necessary to function efficiently in the workforce. Although it is understood that most companies do not hire business graduates with the intent of immediately making them managers, many companies do hire graduates as potential managers. That is, the graduates are set on a management path that may result in the graduate **becoming a manager within five years** of his/her joining the firm. These people will be referred to as **future managers** in the questions below.

4.1 Do colleges and universities adequately prepare future managers with the computing skills / knowledge base that they need to be productive managers in your area in the firm? (Please leave blank if unsure.)

_____ Yes
_____ No - Please elaborate _____
_____
_____
_____

4.2 For each software type listed below, please rate (by circling the appropriate word) how important it is that future managers in your area in the firm learn <u>the specific software packages used in your area in the firm</u> before starting with the firm? (Eg. Is it important that future managers know your specific word processing package (such as WordPerfect) or will proficiency in some other word processing package (such as MicroSoft Word) suffice? <u>Please do not rate an item if the software is not used in your area in the firm.</u>

word processing	Not Important	Preferred	Very Important
spreadsheet analysis	Not Important	Preferred	Very Important
spreadsheet design	Not Important	Preferred	Very Important
database analysis	Not Important	Preferred	Very Important
database design	Not Important	Preferred	Very Important
Internet/info-communication services	Not Important	Preferred	Very Important
accounting	Not Important	Preferred	Very Important
financial planning	Not Important	Preferred	Very Important
statistical analysis	Not Important	Preferred	Very Important
mathematical modelling	Not Important	Preferred	Very Important
graphics	Not Important	Preferred	Very Important
presentation	Not Important	Preferred	Very Important
desktop publishing	Not Important	Preferred	Very Important
expert systems and other high level decision making software	Not Important	Preferred	Very Important
other important computing software _____	Not Important	Preferred	Very Important

4.3 How important is it that future managers learn the specific operating systems used in your area in the firm before starting with your firm? (Eg. is it important to know how to use Windows on an IBM system, or is proficiency with a MacIntosh system sufficient?)

Not Important Preferred Very Important

4.4 How do existing managers learn new software? Please rank the methods (1=most common method). Do not rank a method if it is not used in your firm.

self instruction	_____
In-house training/seminar	_____
Off-site training/seminar	_____
video based instruction	_____
Other _____	_____

Thank you for your input. Please fax your completed questionnaire to:

Doug MacDormand
Business Admin. and Commerce
Red Deer College T4N 5H5
Fax #: (403) 340 8940

Frequency Counts and Comments - Educators Survey

Section 1 - Demographics

1.1 In what type of institution do you teach?

University	36
College/Technical Institute	74

1.2 In what type of Business Program do you teach?

University/University Transfer	36
Business Diploma/Certificate	58
Both	16

1.3 What is your discipline? (If you teach courses in more than one of the following disciplines please rank them, where 1 = main discipline. Rank as many as apply.)

[Frequencies show the number of respondents who choose the discipline as their first choice.]

	All Institutions	Universities	Colleges
Accounting	32	9	23
Finance	5	3	2
Management Science / Statistics / Math	10	3	7
Business Computing	14	3	11
Human Resources / Industrial Relations	3	0	3
Organ. Behaviour/ Organ. Analysis	6	2	4
Business Law	3	1	2
Marketing	19	7	12
Business Economics	4	2	2
Business Policy / General Management	5	3	2
Business Communications	6	2	4

Section 2 - Necessary Skills for Business Graduates

2.1 Consider each of the following Business skills. First rank the top four skills (1=most important) that you believe are most important for a general Business student graduating from your program. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rank the top four skills needed of a graduating Business student specializing in your main discipline. Finally, rank the top four skills needed by managers.

[The frequencies show the number of respondents who ranked the skill as first, second, third, or fourth choice.]

GENERAL BUSINESS GRADUATE

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
planning	4	1	3	5	0	0	0	2	4	1	3	3
organizing	1	5	6	8	0	1	1	2	1	4	5	6
problem solving/creativity	36	14	11	10	14	4	3	3	22	10	8	7
team skills	19	7	13	17	3	3	4	6	16	4	9	11
leadership	0	4	3	0	0	1	0	0	0	3	3	0
supervision	0	0	1	1	0	0	1	0	0	0	0	1
oral communication	18	33	11	7	3	11	2	3	15	22	9	4
written communication	11	26	27	4	4	6	14	1	7	20	13	3
information extraction/analysis	6	7	7	5	4	5	2	1	2	2	5	4
computer usage	1	6	9	18	0	0	3	4	1	6	6	14
theoretical knowledge	6	1	8	7	6	0	3	5	0	1	5	2
technical skills	4	3	3	11	1	1	1	1	3	2	2	10
customer/external relations	4	4	3	6	0	1	0	1	4	3	3	5

MANAGERS

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
planning	11	9	10	9	4	3	3	0	7	6	7	9
organizing	4	9	13	8	1	3	4	3	3	6	9	5
problem solving/creativity	25	18	10	11	10	5	6	1	15	13	4	10
team skills	11	18	11	6	3	6	1	3	8	12	10	3
leadership	31	13	11	5	7	2	6	0	24	11	5	5
supervision	0	4	7	8	0	0	2	4	0	4	5	4
oral communication	10	20	14	9	2	9	6	4	8	11	8	5
written communication	9	11	18	10	4	4	7	3	5	7	11	7
information extraction/analysis	1	1	9	7	0	1	2	3	1	0	7	4
computer usage	1	1	3	2	0	0	2	0	1	1	1	2
theoretical knowledge	1	0	2	4	1	0	1	2	0	0	1	2
technical skills	1	0	0	3	1	0	0	1	0	0	0	2
customer/external relations	0	3	3	5	0	0	0	0	0	3	3	5

[Educators were also asked to assign ranks showing the skills needed by a student graduating in their main discipline. Frequencies are not shown for these rankings, as the number of educators of each discipline (as shown in question 1.3) are too low to be meaningful.]

2.2 What is your estimate of the percentage of students graduating from your institution who will attain managerial positions in their next five years? (Colleges/Technical Institutes: do not consider University Transfer students in your estimate.)

	All Institutions	Universities	Colleges
0%	1	0	1
1% to 19%	23	4	19
20% to 39%	39	13	26
40% to 59%	22	7	15
60% to 79%	13	5	8
80% to 100%	10	6	4

2.3 What is your estimate of the percentage of students specializing in your main discipline and graduating from Business schools who will attain managerial positions in the next five years? (Colleges/Technical Institutes: do not consider University Transfer students in your estimate.)

[Data for this question are not included. The frequencies for the classes of disciplines in question 1.3 were too small to obtain anything useful from this question.]

2.4 What do you perceive to be the main differences between a University Business degree graduate and a College/Technical Institute Business diploma graduate in terms of the types of jobs they will get immediately upon graduation?

Comments from College Instructors:

- college grads have better practical skills whereas U.T. grads demonstrate better theoretical skills. Our surveys reveal college grads to be "on the job ready" quicker that U.T. grads.
- diploma - entry level, continuing education required U.T. - entry level in prof organization, first track in advancement.
- diploma - jobs requiring practical technical skills - hands on work - in accounting firms they work with small business University - jobs requiring same skills as college level grads but with an orientation towards upper level work - in accounting firm big bus.
- diploma grads will do more technical rote work. U. grads will have more responsible jobs which require more analysis and and independent decision making
- diploma grads will receive lower mgmt positions requiring less decision-making skills and offering less challenge managerially and less pay.
- diploma students are hired at very introductory positions
- fewer of our grads will be in the management "scheme".They are more likely to be in supervision of key personnel in "operation" as contrasted to "planning"
- I believe their chances are the same
- I do not perceive any difference in the type of positions either graduate will get - starting level clerical accounting work
- I don't see a big difference when starting employment. Perhaps, the degree student will advance to a higher position, requiring more "generalistic" type skills
- college/Tech - hands on knowledge allows for positions which utilize these skills immediately. U - training period required for similar positions that a college/tech grad would undertake.
- the latter have more appeal to employers due to curriculum emphasis on practical, hands on training plus appropriate attitude. There seems to be a trend where U background (full and partial degree) types enrolling here due to job hunting perceptions
- they are basically competing for the same jobs
- U - higher level, sooner in a managerial position, higher salary on average

- U - staff positions College - line - clerical position
- U grads get jobs at a slightly more senior level and in the bigger companies that close their doors to diploma students.
- U grads will tend to get higher level ,higher paying, entry level jobs.
- U more long range planning, strategy - used to do more supervision but with the reduction of middle managers, supervisory role will come later when graduate has education and experience. Tech - day to day implementation, task orientation
- U tend to start at a higher salary ie. management development or management training program - financial institutions in particular appear to require a degree for this type of program.
- U. grad will try for management training positions . The college grad tries for technical positions
- UT medium to big business Dip = to medium business
- UT will get jobs with higher potential and greater theory required
- University Bus. degree covers the concepts in more rigorous and academic fashion. - College/Tech. level emphasizes skills up to the level of middle management
- university Bus. degree grad: Entry level, middle management position. College/Technical Institute bus. Diploma grad: Entry level, low/basic management position
- university business will enter close to management level. College/institute business will enter basic level
-college grads will be employed as a technician and take 5 years or more to develop. U grads will also start at the technician role but progress faster ie. 3-4 year time frame.
- college - more skill orientated/hands on
- college grad has more hands - on practical based education than the U student. This reality/perception is held by both the student and the employer
- college students will have a lower level, more hands on jobs that a University student
- college/tech - practical immediate jobs at intermediate level. U - theoretical - jobs?
- degree grad would probably get a job which is more managerial while diploma grad would more likely be more technical
- degree student has more breadth that 2 yr. - jobs will be similar - more promotion room for degree student
- depth of knowledge, problem solving skills and attitude
- diploma students may start at a position with more of the routine duties. Degree - students may get more into the planning/analysis type jobs.
- college/tech institute grads may be in slightly more entry level positions that U grads
- entry level - technical vs. entry level - general
- entry level positions are similar but the university student has a better chance of advancing within the organization
- immediate jobs for college/tech institute will likely be very "hands - on" and practical. - There is quite a bit of overlap also.
- income mainly - in the present hiring climate technical skills will even our over theoretical knowledge, all things being equal.
- Technical are more likely to get involved in small business
- many - but may not be a disadvantage
- minimal for those with no or little experience most businesses start at entry level - - regardless of diploma or degree. Diploma grad more likely to go on "nuts and bolts" sales or operation jobs - degree person usually becomes analyst.
- more education, older students graduating from U will get better and higher paying jobs.
- Lots of the time the piece of paper the degree will make the difference
- more hands on for Tech Institute less training required
- more hands-on, practical, technical skills such as book keeping, computer operator, cashiers, clerks
- more technical jobs, lower level, more specific and detailed assignments
- no difference
- no difference short term. Long term maybe. If a student is able to get their "foot in the

door" and prove that they have the knowledge/skills/ability to become management material a U degree is not necessary.
- no real difference - Tech grads have more practical, usable skills in beginning
- none
- none - only later do they begin to separate.
- none because at college level the focus is on core business coursed whereas at university the focus in on core plus options which may not be business related (eg. psyc.,soc, etc.)
- none today
- none, both or entry level preparation programs
- not much
- practical knowledge will give technical /college grads and intermediate position in the organization - University grads need more training on tech/practical skills
- tech - small business (50 less employees. Degree - large companies (50 more employees)
- very kittle - I would expect U grads to have a broader based education and perhaps to advance more rapidly.
- very little
- virtually nil - except for some large national firs virtually all medium to small businesses make little or no differentiation

Comments from university professors:
- a college/tech inst.diploma will lead to more specialized jobs whereas university Bus. degree may require some further training. However the latter can assume more responsibility at earlier stages of the career.
- business school grads will attain jobs where a more comprehensive view of business is required. As well, they will attain jobs which are more technically challenging.
- college grads will get the more technical jobs such as copy writing, layout, campaign design etc. U grads will be hired to supervise the college grads and liaison with the other functional areas of the firm
- college/tech grads - technical type jobs entry level. U - Jr. management trainee positions.
- degree grads may have better shot at management trainee positions and be more willing to relocate to find suitable jobs. Co-op degree grads esp. due to additional experience
- grads sell themselves partly on the quality of the institution which they graduate. - - Differences will be real until the grads are able to prove their own worth. There will be pay and benefit differences at the outset.
- immediately diploma people have better technical skills and lower expectations in terms of salary and job condition. Thus they get hired faster. But the depth of their knowledge is not as great.
- the diploma grad probably gets a more "hands - on "job
- the former is conceptually based thus grows into leadership. the latter is technically based and provides input to management
- U - problem solving/ report writing type jobs. Tech - computer work; training of non-users trouble shooting, installing new software
- U grads are more likely to achieve managerial positions as opposed to technician positions. Are also likely to be promoted to higher levels in their careers
- U grads will get a job with more upward potential; tech grads will get a very technical job with little upward potential
- U grads will have greater breadth of opportunity in types of jobs available with greater opportunities to move up career ladder. However, actual job advancements have more to do with individual characteristics that level or type of education.
- U graduate should be better able to critically and creatively analyse problems, conduct research
- U-more likely to obtain managerial track job

- U. grad has more theoretical knowledge and broader education, hence can handle jobs where "soft" skills are at a premium vs. purely technical skills
- U: trajectory towards responsible position in very near term if not immediately. College - supervisory
- better education - more prestige. will be given positions of power and influence sooner (managerial positions more readily available
- business school - management, coordinating etc. college - technical support, hands on entry level
- immediately : not much difference
- jobs will probably be the same - college grads won't get jobs with the big multinationals
- jobs with high growth potentially more likely for a U grad
- main difference is opportunity for significant advancement form entry level position. - - Actual job tasks would probably be similar
- mainly the level at which they enter an organization
- more general management training for U grads - less technician positions
- no differences initially
- public accounting firms require graduates from universities. CMA's will require university degrees
- stronger theoretical - broader discipline exposure
- title and perhaps salary - actual jobs are not very different
- very little. U students should have the flexibility to do a wider range of things well and to develop themselves in the intermediate term

Section 3 - The Importance of Specific Computing Skills/Concepts =======

3.1 For each of the following theory concepts please rate how important it is that a general Business student graduating from your Program be **knowledgable about the subject matter**. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rate the importance of this knowledge for graduating Business students specializing in your main discipline. Finally, rate the importance of this knowledge for managers.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the theory concept.

GENERAL BUSINESS GRADUATE

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
cost/benefit analysis of tech. acq.	7	12	59	16	2	2	20	6	5	10	39	10
ethics of info. access and usage	3	8	55	30	1	4	16	11	2	4	39	19
computing hardware	14	30	40	13	5	11	15	1	9	19	25	12
network/communication techn.	6	31	45	14	2	12	16	2	4	19	29	12
MIS decision support systems des.	10	34	41	9	2	14	11	3	8	20	30	6
MIS transaction process. sys. des.	11	40	29	6	2	17	9	1	9	23	20	5

MANAGERS

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
cost/benefit analysis of tech. acq.	9	6	36	45	1	2	10	17	8	4	26	28
ethics of info. access and usage	5	4	42	45	2	2	15	13	3	2	27	32
computing hardware	17	23	41	13	6	10	14	1	11	13	27	12
network/communication techn.	8	24	52	12	4	10	15	3	4	14	37	9
MIS decision support systems des.	14	17	48	17	5	6	17	3	9	11	31	14
MIS transaction process. sys. des.	13	31	35	9	5	11	11	3	8	20	24	6

[Educators were also asked to assign ratings showing the importance of these knowledge concepts to a student graduating in their main discipline. Frequencies are not shown for these ratings, as the number of educators of each discipline (as shown in question 1.3) are too low to be meaningful.]

3.2 For each of the following **theory concepts** please indicate whether the concept is taught in a Business computing course and/or in some other course(s).

[Full summary tables of the data collected for this question in the body of the text.]

3.3 If any of the above theory concepts are taught in either Business Computing or other courses, but the coverage is inadequate, please list the concept and briefly describe the inadequacy.

Comments:

- workshops are offered as non-credit seminars but only cover spreadsheets and word processing. Need to cover presentation graphics, database, Internet, E-mail
- none of the above is adequate
- network/communication techniques theory only
- most of the above is given coverage that is adequate. More time needs to be spent on all around. More project work is required. However budgets and time constraints don't allow for more coverage
- ethics of information access and usage - needs to be looked at more closely
- all are superficial
- the business computing course is an overview and is hands on orientated
- knowledge of how to use software to produce statistics, reports, spreadsheets. Some students think the computer will "do it all" and they don't have to learn math concepts.
- ethics of...cannot be emphasized or dealt with too much; needs to be thoroughly covered in all areas
- computing hardware: Our course looks at input/output and processing devices but only mentions them without looking at how they work, which are suitable for various applications, few demos of more advanced systems.
- all inadequate. What do you expect - academic people doing the teaching

3.4 Please rate how important it is that a general Business student graduating from your Program be proficient in the following software. (Colleges/Trade Institutes: please do not consider University Transfer students in your assessment). Next rate the importance of the software for graduating Business students specializing in your main discipline. Finally, rate the importance of the software for managers.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software.

GENERAL BUSINESS GRADUATE

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
word processing	4	3	31	67	0	0	6	27	4	3	25	40
spreadsheet analysis	3	9	30	61	0	0	8	25	3	9	22	36
spreadsheet design	12	19	29	39	4	6	11	11	8	13	18	28
database analysis	4	12	54	28	1	4	20	7	3	8	34	21
database design	14	24	42	16	5	11	13	2	9	13	29	14
Internet/info-communication serv.	3	22	51	23	1	8	17	7	2	14	34	16
accounting	5	18	51	29	2	8	20	3	3	10	31	26
financial planning	5	17	58	19	1	3	26	2	4	14	32	17
statistical	6	29	51	13	0	8	19	5	6	21	32	8
mathematical modelling	21	46	28	2	4	18	10	0	17	28	18	2
graphics	6	27	46	18	2	10	16	5	4	17	30	13
presentation	1	9	59	30	0	5	23	5	1	4	36	25
desktop publishing	12	27	47	11	6	13	13	1	6	14	34	10
expert systems and high level	27	42	22	1	8	13	8	0	19	29	14	1

MANAGERS

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
word processing	7	13	36	46	0	3	10	20	7	10	26	26
spreadsheet analysis	2	8	30	61	0	2	9	22	2	6	21	39
spreadsheet design	13	19	33	34	5	6	13	8	8	13	20	26
database analysis	7	12	39	38	3	3	13	13	4	9	26	25
database design	15	23	40	17	7	8	12	4	8	15	28	13
Internet/info-communication serv.	5	18	45	29	2	11	12	8	3	7	33	21
accounting	8	19	53	22	3	8	15	7	5	11	38	15
financial planning	6	7	61	25	1	3	21	7	5	4	40	18
statistical	8	31	40	17	1	9	15	7	7	22	25	10
mathematical modelling	25	40	27	4	7	14	11	0	18	26	16	4
graphics	7	34	39	15	2	12	13	6	5	22	26	9
presentation	2	15	44	36	0	8	15	10	2	7	29	26
desktop publishing	18	30	37	11	7	13	10	3	11	17	27	8
expert systems and high level	20	31	32	7	9	8	11	2	11	23	21	5

[Five educators also mentioned: project management, problem solving, organizer, multimedia, and maps/location of customers software. Educators were also asked to assign ratings showing the importance of software to a student graduating in their main discipline. Frequencies are not shown due to the low frequencies for question 1.3.]

3.5 For each of the following **software** please indicate whether the software is utilized in a Business computing course and/or in some other course(s).

[Full summary tables of the data collected for this question in the body of the text.]

3.6 If any of the above software is utilized in either Business computing or other courses, but the utilization is inadequate, please list the software and briefly describe the inadequacy.

Comments:
- very little of the software is integrated into the other courses as it should be. It is taught as separate courses.
- most
- data base, Internet, publishing, presentation graphics
- statistical - we use 5x but to a very limited degree - only brief demos
- more accounting packages needed
- not sufficient access time
- Internet anything is inadequate
- our software is very out of date; we are not exposing students to the most current software available
- old versions
- Internet
- yes, simulations in business 310, marketing, and finance

Section 4 - The Business Computing Course ==========

4.1 SHOULD students in Business Programs be required to take a computing course? (Colleges/Technical Institutes: do not consider University Transfer students.)
(Check one only)

	All Institutions	Universities	Colleges
Yes	76	13	63
Yes - but only if they haven't acquired the skills/theory elsewhere	26	16	10
No	2	2	0

If you answered NO to the above question please skip to question 4.5

4.2 In which year of the Program should a Business student take their first computing course?

	All Institutions	Universities	Colleges
First year	95	25	70
Second year	9	7	2
Third or Fourth	0	0	0

4.3 Is one (i.e. equivalent to a single term/half year) introductory computing course sufficient to equip the Business student with the necessary hands-on computing skills that they need for other Business courses?

	All Institutions	Universities	Colleges
Yes	43	19	24
No	59	12	47

Comments From College Instructors:

- 2 courses - one on micros productivity tools ie. word pro/ss/db other on information processing in general.
- 2 semesters needed for good coverage.
- because the computer is used in every aspect of a Business career, a wider scope of basic knowledge is needed than can be accomplished in one introductory term course.
- for hands-on - need more time.
- Internet more than one course
- hands on skills require practice and problem solving for which one semester is not adequate
- inadequate - more counter-productive. Let's show applications at the same time as teach computing.
- intro - need more advanced spreadsheet etc.
- intro and an advanced class
- it is essential they become proficient. The only way this will happen is if they keep upgrading throughout the program.
- no specialization to field of study
- non computing courses should have a computed component where applicable
- not unless its a 100 hour course! Need more knowledge of the Potential of WP, spreadsheets and database
- one course may do if computers are integrated into the entire program
- students must be proficient
- the process has to be continuous
- they need more time with help available
- a student likely needs up to 4 courses to adequately understand the value of computers
- content of the course would dictate whether one was enough
- computer application can be brought into almost any course. Students are coming in with better skills so we can go further.
- more skills and work is necessary
- need 2-3 specialized courses - word processing graphics, presentation etc.
- need an intermediate level of knowledge
- needs adequate skills in all major software applications
- one course completed in 1st semester does not give the student depth of knowledge or enough hands - on application as is relates to their subject areas.
- personal experience has shown that students must be shown what is available and helped in the search to find uses at computers. It is not enough to simply introduce students to computers and expect they will explore on their own.
- principles in one course need applications in several more
- should be accompanied with applications and design study - at an introductory level.
- should be supplemented in course specific application
- should have two semesters at least
- students need to practice their sills over the whole first year

Comments From University Professors:
- higher level skills are needed for the transition to work
- it depends on their needs. Many students need more than one course.
- it should be at least two single term courses
- not unless already proficient in different types of software ie. WP. graphics spreadsheets, presentation
- the real answer is "it depends" many students have acquired these skills outside U, For them 1 course is more than enough. Having other courses available is important for those who need to sharpen these skills
- they need extensive general knowledge as well as specific skills - eg. WP spreadsheets, so they can make intelligent technical choices.
- to truly understand the computer and its capabilities, students should be required to learn a programming language. This will provide them with the logical skills needed to use canned packages
- too much to learn in one course - again it depends on content
- need database experience sets. (WP + SS is not enough)
- not at the rate information technology is expanding - too much for one course

4.4 Do University/University Transfer students have different computing needs than Business Admin. Diploma/Certificate students?

	All Institutions	Universities	Colleges
No	69	14	55
Yes	24	10	14

Comments:
- presentation skills more important
- only because I assume they go to lower level jobs.
- need to be more knowledgable
- need broader theoretical base
- more involvement with statistical and mathematic modelling, expert systems and other high level decision making software
- greater expectations from a 4-5 year degree student
- everyone these days needs at least an intro class - best to have an advanced class too!
- depends on UT majors
- depending on program they take
- business students need more that Arts etc.
at the basic level
- almost identical. Should be the same. One course is modularized the other is not.
- U students have less time to master much of the detail
- they need to know all that the diploma students know and then more.
- probably more conceptual and analytical needs - that's why spreadsheet use is much more important than "canned"software
- less technical for university but more theoretical and general for universities.
- I would expect that the later would not need the statistical software training.
- Bus. Adm. diploma - more hands-on
- Bus Adm D/C need more - U transfer students are taking a broader general purpose degree

4.5 ARE students in your Business Program required to take a computing course? (Colleges/Technical Institutes: do not consider University Transfer students.)

	All Institutions	Universities	Colleges
Yes	90	23	67
No	14	9	5

4.6 Does an instructor in your Business Program teach a Business Computing course? (This does not include discipline specific courses where computer usage is secondary to subject content. eg. an Accounting course that uses a spreadsheet or GL program. This also does not include a Computing or Business Computing course which is taught by instructors from a different program (such as Computing Science).)

	All Institutions	Universities	Colleges
Yes	80	20	60
No	22	10	12

4.7 Do you teach a Business computing course?

	All Institutions	Universities	Colleges
Yes	33	3	30
No	74	31	43

Section 5 - The Role of Computers in Your Courses ==========

5.1 Do students use the computer in any of your courses?

	All Institutions	Universities	Colleges
Not at all	16	6	10
Students only analyse distributed output	2	1	1
Yes, students acquire hands-on experience in my courses	80	21	59

Please skip to question 5.5 this section if you did not answer Yes to the question above.

5.2 Are students given assignment(s) for grade requiring the use of the computer?

	All Institutions	Universities	Colleges
No	22	10	12
Yes	64	17	47

5.3 Do students have lab time to use the computer? (Check as many as apply)

	All Institutions	Universities	Colleges
Expected to do the work on their own, when a computer is available	54	19	35
Casual lab time is booked for the students with no instructor, nor lab/TA inst.	11	3	8
Casual lab time is booked for the students with the instructor, lab/TA available	20	7	13
Weekly labs are set for students	36	6	30

5.4 How do students learn to use the computer? (Check as many as apply)

	All Institutions	Universities	Colleges
They are expected to learn the program(s) on their own	35	18	17
Students buy a required or recommended tutorial/reference guide	24	3	21
In-class (as opposed to in-lab) demonstrations are given	39	10	29
Lab demonstrations are given	45	6	39
Class handouts are given	41	9	32
On-line tutorials are used	22	2	20

5.5 Do you believe that there is (or would be) a 'hands-on versus theory' tradeoff if computers are taught in your course(s) - (where 'theory' refers to theory concepts of your main discipline - eg. accounting theory)?

	All Institutions	Universities	Colleges
Yes [students do not use the computer in my course(s)]	10	2	8
Yes [but the tradeoff is worth it; students do use the computer]	27	6	21
No or not significant [students do use the computer]	38	14	24
No or not significant [students do not need to use the computer in my course(s)]	9	3	6

5.6 Are you aware of any studies that assess whether students benefit from using the computer in courses of your main discipline?

	All Institutions	Universities	Colleges
Yes [they show that the costs outweigh the benefits]	4	1	3
Yes [they show that the benefits outweigh the costs]	14	3	11
No [but I believe that the costs outweigh the benefits]	17	6	11
No [but I believe that the benefits outweigh the costs]	51	15	36

Section 6 - The Role of Computers in Your Program

6.1 How would you rate your own level of mastery of computer usage? (Please circle the appropriate number. Do not choose a position between two numbers - such as 2.5)

1 = none
2 = slight
3 = moderate
4 = extensive

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	1	14	54	38	0	4	16	14	1	10	38	24

6.2 How would you rate the average level of mastery of computers usage of other colleagues of your main discipline? (Leave all numbers uncircled if you are unaware of their level of mastery.)

1 = none
2 = slight
3 = moderate
4 = extensive

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	1	17	68	16	0	4	24	6	1	13	44	10

6.3 How would you rate the average level of mastery of computers usage of other colleagues in your Business Program? (Leave all numbers uncircled if you are unaware of their level of mastery.)

1 = none
2 = slight
3 = moderate
4 = extensive

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	0	22	64	11	0	4	22	4	0	18	42	7

6.4 Does your Business Program have a specific plan for the integration of computers into the Business curriculum?

	All Institutions	Universities	Colleges
Yes	57	15	42
No	45	16	29

6.5 At what rate, during the past three years, has computer usage been integrated into Business courses in your program?

1 = very slowly or not at all
2 = slowly
3 = quickly
4 = very quickly

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	3	50	36	11	0	16	11	3	3	34	25	8

6.6 At what rate, during the next three years, should computer usage be integrated into the Business courses in your program?

1 = very slowly or not at all
2 = slowly
3 = quickly
4 = very quickly

	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	4	21	47	29	1	8	16	5	3	13	31	24

6.7 At what rate, during the past three years, has computer usage been integrated into the Business courses of your main discipline?

1 = very slowly or not at all 2 = slowly 3 = quickly 4 = very quickly	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	18	41	25	18	3	14	6	8	15	27	19	10

6.8 At what rate, during the next three years, should computer usage be integrated into the Business courses in your main discipline?

1 = very slowly or not at all 2 = slowly 3 = quickly 4 = very quickly	All				Universities				Colleges			
	1	2	3	4	1	2	3	4	1	2	3	4
	12	23	40	28	3	7	13	8	9	16	27	20

6.9 Has inadequacy of computing facilities hindered the usage of computers in your classes?

	All Institutions	Universities	Colleges
No	62	18	44
Yes	43	15	28

Comments From College Instructors:

- too much demand, too few facilities
- too many students too few computers
- time, software, power a hindrance
- the lack of time and the lack of access to facilities doesn't allow us to properly prepare students to use computers
- the labs are booked SOLID - hard to get time for a few classes in statistics
- student access - would like to teach statistics
- still working with Dos
- slow - instructors using old technology - no computer lab available - system down a lot - time and red tape involved - every classroom should be a computer lab
- personal preference - students should be able to use computers for all learning
- not on windows - labs are being converted now
- not enough lab time available-$problem
- not enough terminals
- not enough labs and out dated
- not enough hardware available to adequately teach students - also serious network problems
- not enough computers for student use - required software not available on all computers
- inadequacy of printers at peak times
- not enough computers and labtime
- no money to upgrade existing labs or install new/more labs to satisfy all our needs
- need more labs
- more labs and free times availability and improved computer facilities and equipment
- lack of equipment and software
- labs are unsuitable - using 286's - need windows environment - more speed, memory, storage, etc. to make it work
- keeping up with hardware and software changes is hard but students need to learn the latest to be ready for the business world.
- it is a struggle to get hardware and software ourselves Admin does not support or facilitate actually our progress
- insufficient funding for software/ hardware

- insufficient # and quality of computers - cost prohibits Internet therefore no Internet access for students
- inadequate lab time
- inadequate hardware
- if everyone has access to a lap top then ease of use would encourage use.
- hard to keep up with current technology because of budget restrictions. Integration into all courses requires more availability - are looking towards assisting students with purchase of computer that can be used at home
- finding lab time is difficult
- difficult to book lab time
- but not recently - access funding from Govt will allow a lab purchase next spring and we are presently using all 486 DX/50+/66's
- although computers are available for student use, they have not been provided to the instructors. Many instructors do not as a result have even basic computer skills
- accessibility has been a problem. Also funding for up to date equipment
- I don't have a computer so its very difficult for me to become proficient and to assess computer pkgs available to students
- govt budget restraints
- 100% of lab time booked - hardware out of date - no software budget to speak of - no Internet budget available - no budget for data base access etc.

Comments From University Professors:
- we never can or will keep up fully to new technologies/software due to cost
- tech changes so fast we can't keep up
- students face hardware and software problems in the labs while doing their assignments
- software is limiting - old version of lotus for spreadsheets in labs, on network, and faculty offices
- poor equipment - virus problems - no support for computer labs
- not mine - but my colleagues
- not enough machines in the labs
- not enough finding to provide instructors to train hands - on training
- not enough computers! plus inadequate maintenance of network, printing problems, software licensing prcblems
- not enough computer labs ie. computers
- most students cannot afford their own computers. Lab facilities are inadequate, particularly at peak times during the semester. (term papers etc.)
- labs too busy
- insufficient capacity to handle student load
- inadequate software, networking and hardware availability. Wrong approach being employed - inappropriate reliance of public facilities
- hardware capacity, software availability
- fear of computers - general attitude that they don't need to learn underlying math concepts - no time to learn, no opportunity - on expectation that they MUST have word processing spreadsheet and stats as a minimum to graduate
- low memory - now or outdated versions - now ok
- 45 machines for 1500 undergrads

6.10 Has your Business Program, in the last three years, conducted an employer survey to assess the computing needs of the business community?

	All Institutions	Universities	Colleges
No	41	7	34
Yes	48	14	34

Comments:

- we're on the right track
- want currency-prefer students to have proficiency in the up-to-date software
- the survey resulted in the introduction of a second computer skill course providing advanced business software training
- reviewing value and providing students with Internet training
- rate increase at transactional level and increasing at management level
- employers consider computer skills of coop students less than needed for the job
- almost all use computers; lots of custom made software is used; few databases used
- WP for Windows is holding its own. Powerpoint widely used. More networks than two years ago.
- Internet? part of our curriculum?

Frequency Counts and Comments - Companies Survey

Section 1 - Demographics ==========

1.1 What is your firm's name? [This data is not included in order to maintain anonymity.]

1.2 What is your job title? [Some titles have been altered slightly - with an XXX - so as not to reveal the name of the company.]

Accountant
Administration Manager
Administrator
Area Manager
Assistant Manager
Assistant Secretary Treasurer
Assistant Guest Services Manager
Branch Manager
C.F.O.
Computer Controller
Consultant / Teacher
Controller
Controller
Controller
Controller
Coordinator Personnel Services
Controller
Customer Series Supervisor
Director - Information Services
Director, Corporate Finance
Executive Director
Franchise Operator
General Manager
General Manager
General Manager
General Manager
General Manager, XXX Division
Human Resource Consultant
Human Resources Administration
Human Resources Consultant
Human Resources Manager
LAN Administrator
MIS Manager
Manager
Manager
Manager
Manager Customer Service
Manager Human Resources
Manager XXX Operations
Manager Retail Banking
Manager of Banking Floor Operations
Manager, Accounting & Administration
Manager, Business Systems
XXX Alberta Manager
Office Administrative Assistant
Office Administrator
Office Administrator
Office Coordinator
Office Manager
Office Manager
Office Manager
Office Manager
Office Manager
Officer, Employee Relations
Operation Center Manager
Organization Development Director
Owner
Owner
Owner
Owner / Manager
Owner / Manager
Owner / Operator
Pharmacist - Owner
Plant Manager
Plant Manager
President
President
President
President
President / Insurance Broker
Proprietor
Site Controller
Staff Development Coordinator
Store Manager
Store Manager
Supervisor, Human Resources
Systems Coordinator
Team Leader, Applications
Technical Sales Representative
Vice President / Office Manager
Vice President, Finance

1.3 In which functional business area are you a manager in your firm? (Check one only.) Note: smaller companies may not have separate managers for the functional areas listed below, and so should check General Manager.)

	All Companies	Small	Large
General Manager	39	34	5
Accounting / Finance	2	2	0
Marketing / Sales	7	0	7
Manufacturing (eg. Processing or Plant)	17	11	6
Information Systems / Computing Services	3	3	0
Human Resources	14	3	11

1.4 In which city/area are you located?

	All Companies	Small	Large
Red Deer	52	40	12
Edmonton	16	9	7
Calgary	14	4	10

1.5 In which industrial sector is your firm best placed? (Check one only.)

	All Companies	Small	Large
Agriculture	4	4	0
Natural Resources	10	6	4
Manufacturing	10	5	5
Construction	9	9	0
Transportation	3	1	2
Communication and Other Utilities	9	3	6
Retail and Wholesale Trade	9	4	5
Finance and Insurance	9	8	1
Other Business services	7	7	0
Government, Health, Education, Community Services	12	6	6

1.6 Approximately how many full-time employees are employed in your firm?

	Small	Large
1 to 9	19	--
10 to 19	16	--
20 to 49	13	--
50 to 99	5	--
100 to 499	--	11
500 to 1000	--	6
1000 to 4999	--	9
5000 to 23000	--	3

1.7 Approximately how many of these employees are managers in the firm? (See the note at the top of this page for a definition of manager / business professional.)

	All Companies	Small	Large
1 to 9	55	52	3
10 to 19	6	1	5
20 to 49	6	0	6
50 to 99	4	0	4
100 to 499	8	--	8
500 to 1000	2	--	2
1000 to 4999	0	--	0
5000 to 23000	0	--	0

1.8 Approximately what percentage of these managers engage in frequent hands-on use of computers (as opposed to delegating computer usage to a subordinate)?

	All Companies	Small	Large
0%	1	1	0
1% to 19%	3	2	1
20% to 39%	10	6	4
40% to 59%	9	6	3
60% to 79%	11	4	7
80% to 100%	45	33	12

1.9 Approximately what percentage of these managers are graduates of a business program (i.e. hold a business diploma or degree)?

	All Companies	Small	Large
0%	16	15	1
1% to 19%	7	2	5
20% to 39%	9	6	3
40% to 59%	16	10	6
60% to 79%	10	6	4
80% to 100%	14	11	3

Section 2 - Necessary Skills for Managers ==========

2.1 Below are listed several business skills. Rank the top four skills (1=most important) that you believe are most important for a manager in your functional business area in the firm. (Note: "in your functional area" refers to the area that you checked in question 1.3 on the first page.)

[The frequencies show the number of respondents who ranked the skill as a first, second, third, or fourth choice.]

	All				Small				Large			
	1	2	3	4	1	2	3	4	1	2	3	4
planning	3	12	11	10	2	6	5	7	1	6	6	3
organizing	2	10	12	9	1	8	10	3	1	2	2	6
problem solving/creativity	14	12	6	11	7	6	4	9	7	6	2	2
team skills	8	8	3	8	6	4	3	6	2	4	0	2
leadership	24	12	3	2	11	10	1	2	13	2	2	0
supervision	2	5	2	3	2	4	2	1	0	1	0	2
oral communication	2	8	9	6	2	5	5	3	0	3	4	3
written communication	0	1	2	5	0	0	1	3	0	1	1	2
information extraction/analysis	3	8	5	1	2	4	3	1	1	2	2	0
computer usage	0	3	5	3	0	3	5	2	0	0	0	1
theoretical knowledge	4	3	3	1	4	3	0	1	0	0	3	0
technical skills	3	5	4	7	3	4	1	3	0	1	3	4
customer/external relations	9	15	8	8	6	10	5	5	3	5	3	3

[financial and marketing skills were also mentioned by two respondents]

Section 3 - The Importance of Specific Computing Skills/Concepts =======

3.1 For each of the following knowledge areas please rate how important it is that a manager in your area in the firm be **knowledgable about the subject matter**.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the knowledge area..

	All				Small				Large			
	1	2	3	4	1	2	3	4	1	2	3	4
cost/benefit analysis of tech. acq.	8	8	33	27	6	3	20	19	2	5	13	8
ethics of info. access and usage	3	11	36	26	2	7	25	14	1	4	11	12
computing hardware	10	24	34	7	3	14	24	6	7	10	10	1
network/communication techn.	11	26	35	6	5	19	21	4	6	7	14	2
MIS decision support systems des.	8	21	30	14	5	13	18	8	3	8	12	6
MIS transaction process. sys. des.	8	20	19	11	4	13	14	6	4	7	5	5

[familiarity with operating systems (e.g. Windows) was mentioned by two respondents]

3.2 Please rate how important it is that a manager in your area in the firm be **proficient in hands-on use of the following software**.

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software.

	All				Small				Large			
	1	2	3	4	1	2	3	4	1	2	3	4
word processing	2	10	35	34	1	5	20	26	1	5	15	8
spreadsheet analysis	8	7	44	21	7	4	29	11	1	3	15	10
spreadsheet design	12	24	28	14	7	17	20	6	5	7	8	8
database analysis	14	22	26	16	9	14	14	13	5	8	12	3
database design	17	31	21	7	9	20	15	5	8	11	6	2
Internet/info-communication serv.	16	32	21	9	8	24	11	8	8	8	10	1
accounting	7	19	21	34	4	12	12	25	3	7	9	9
financial planning	9	14	23	32	5	10	14	22	4	4	9	10
statistical analysis	6	20	30	17	5	14	16	12	1	6	14	5
mathematical modelling	25	29	16	3	11	21	13	2	14	8	3	1
graphics	15	35	20	5	10	26	10	3	5	9	10	2
presentation	9	23	37	7	7	16	20	5	2	7	17	2
desktop publishing	25	32	12	2	13	22	9	2	12	10	3	0
expert systems and high level	25	34	6	2	15	22	5	1	10	12	1	1

[Project manager and network software skills were mentioned by two respondents]

3.3 For each of the following **software** types, list up to two packages/products used by managers in your area in the firm. Also include the version numbers, and system/platform if known. (Eg. WordPerfect 6.1 for Windows 95) Leave the spaces blank if the software is not used by managers in your area in the firm.

[Full summary tables of the data collected for this question appear in the body of the text.]

3.4 Below are some of the possible uses of some of the software applications listed above. Please rate how important it is that a manager in your area in the firm be **proficient in hands-on usage of the software in this fashion.**

Use the following rating scale:

1 = Very Unimportant
2 = Somewhat Unimportant
3 = Somewhat Important
4 = Very Important
Leave the space blank if you cannot rate the software usage.

	All				Small				Large			
	1	2	3	4	1	2	3	4	1	2	3	4
spreadsheet software												
- financial reporting and monitor.	7	13	23	34	4	8	14	22	3	5	9	12
- graphical presentations	13	32	25	3	11	20	15	1	2	12	10	2
- statistical analysis	8	15	36	13	5	12	20	8	3	3	16	5
- other modelling or simulation	15	17	23	3	10	8	17	0	5	9	6	3
database software												
- interactive transaction process.	17	22	15	14	8	13	12	11	9	9	3	3
- historical batch record keeping	21	26	13	12	10	16	9	11	11	10	4	1
- ad hoc reporting and querying	14	20	25	13	11	13	13	8	3	7	12	5
- routine reporting and summariz.	10	16	25	22	7	7	15	18	3	9	10	4
- advanced data analysis	22	23	9	7	14	13	6	4	8	10	3	3
Internet / telecomm. software												
- electronic communications	12	14	15	23	8	8	9	12	4	6	6	11
- information gathering/research	17	20	16	10	12	10	8	8	5	10	8	2
- making info. available	20	13	17	9	12	7	11	7	8	6	6	2
- conducting business	27	13	10	10	13	9	7	9	14	4	3	1
- remote application usage	27	19	10	0	15	14	6	0	12	5	4	0

3.5 Indicate any other specialized application software used by managers in your area in the firm. (Eg. accounting, statistical, project management, etc.) Also, briefly describe how this software is used.

Software	Usage
4th Dimension	custom program
ABACUS 2	accounting
ACCPAC BPI/plus (7 entries)	accounting, financial reporting, general ledger
ACT	scheduling
Adobe Photoshop	graphics
Adobe Illustration Graphics	graphic designs, first step in manufacturing
Agromanager	math calculations/ information facts
Ammortize	ammortization schedules
Auto CAD (2 entries)	drafting of plans
Bedford	accounting
Bell Charts	mutual fund statistical info.
Business Visions II	financial statements, bookkeeping
Butler Advantage	building pricing
CA BPI Accting Vigilant	charts, etc.
CIMDATA 3.06	specialized insurance software processing,
Conac Accounting	accounting and job tasking
Extreme 3D	graphics
File Maker Pro	F/S, A/P, purchasing/stores
Freehand 5.5	graphics
Freelance	diagrams
Great Plains Accounting (2 entries)	job cost, executive adviser, module calculates, graphs, multiuser software for G/L, A/R, A/P, expense
Harvard Graphics	graphs
INMAGK	distributor
Labels	labels
Lotus Organizer	personal task and information managers
MAS 90	accounting
MAX MRP	material reporting procedures and inventory control
Microsoft Project (3 entries)	project management for software development projects
Microsoft Schedule	daily journal
New Printshop	signs
On time LAN	time management
Powerpoint (2 entries)	presentations
Print Shop Deluxe	desktop publishing
Publish It	diagrams
Quickbooks (2 entries)	accounting
Quicken	cheque tracking
Retirement Planning	planning / projections
Simply Accounting (4 entries)	accounting, payroll, database
Softplan	residential floor plan design system
SPSS-PC	statistics
Tax Prep	personal, corporate, trust tax
TSC Software	warehouse, accounting, budgeting, purchasing

Section 4 - Educating Present and Future Managers ==========

An important issue addressed by this survey concerns how well business schools equip future managers with the computing skills necessary to function efficiently in the workforce. Although it is understood that most companies do not hire business graduates with the intent of immediately making them managers, many companies do hire graduates as potential managers. That is, the graduates are set on a management path that may result in the graduate **becoming a manager within five years** of his/her joining the firm. These people will be referred to as **future managers** in the questions below.

4.1 Do colleges and universities adequately prepare future managers with the computing skills / knowledge base that they need to be productive managers in your area in the firm? (Please leave blank if unsure.)

	All Companies	Small	Large
Yes	34	20	14
No	13	10	3

[A full listing of comments appears in the body of the text.]

4.2 For each software type listed below, please rate (by circling the appropriate word) how important it is that future managers in your area in the firm learn the specific software packages used in your area in the firm before starting with the firm? (Eg. Is it important that future managers know your specific word processing package (such as WordPerfect) or will proficiency in some other word processing package (such as Microsoft Word) suffice? Please do not rate an item if the software is not used in your area in the firm.

	All Companies			Small			Large		
	NI	P	VI	NI	P	V	NI	P	V
word processing	10	45	24	6	26	19	4	19	5
spreadsheet analysis	12	40	21	9	22	14	3	18	7
spreadsheet design	28	28	14	17	19	8	11	9	6
database analysis	21	39	9	12	27	6	9	12	3
database design	35	27	4	19	21	2	16	6	2
Internet/info-communication serv.	28	31	8	16	19	8	12	12	0
accounting	19	25	27	11	15	22	8	10	5
financial planning	21	27	20	11	18	15	10	9	5
statistical analysis	22	33	11	13	22	6	9	11	5
mathematical modelling	41	14	5	23	13	3	18	1	2
graphics	35	21	4	24	13	2	11	8	2
presentation	25	30	5	15	20	3	10	10	2
desktop publishing	37	19	2	20	16	1	17	3	1
expert systems and high level	35	18	1	20	16	1	15	2	0

[Project manager and C.A.D. were also mentioned by two respondents]

4.3 How important is it that future managers learn the specific operating systems used in your area in the firm before starting with your firm? (Eg. is it important to know how to use Windows on an IBM system, or is proficiency with a Macintosh system sufficient?)

All Companies			Small			Large		
NI	P	VI	NI	P	V	NI	P	V
17	49	13	8	32	10	9	17	3

4.4 How do existing managers learn new software? Please rank the methods (1=most common method). Do not rank a method if it is not used in your firm.

	All				Small				Large			
	1	2	3	4	1	2	3	4	1	2	3	4
self instruction	35	21	10	0	23	10	7	0	12	11	3	0
in-house training/seminar	30	18	8	2	20	7	5	2	10	11	3	0
off-site training/seminar	14	25	12	3	12	17	2	2	2	8	10	1
video based instruction	2	8	3	7	1	4	2	4	1	4	1	3

Example of Friedman's Analysis - Input and Output

The table below shows the data as displayed in the spreadsheet.
(Note: only seven of the thirteen columns representing the thirteen business skills are shown here. Also only six of the eighty-two rows are shown here.)

The first column is a classification variable:
1 = small company; 0 = large company
The other columns show ranks of 1 to 4. Many entries show a 5, indicating that the skill was not chosen by the respondent as one of the four most important skills.

Small	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6	2.1.7
0	2.0	4.0	5.0	5.0	1.0	5.0	5.0
0	4.0	5.0	5.0	2.0	1.0	5.0	3.0
0	5.0	5.0	3.0	5.0	1.0	5.0	4.0
1	5.0	5.0	1.0	3.0	5.0	5.0	5.0
1	1.0	2.0	5.0	5.0	3.0	5.0	5.0
1	4.0	5.0	5.0	5.0	1.0	5.0	3.0

The output below shows the MINITAB output for the Friedman's test on the thirteen business skills variables. The overall p-value of 0.000 shows that there are significant differences in the rankings of the variables. The sum of ranks or estimated medians can be used to ascertain which skills are considered more important than others. The lower the sum or median, the more important the skill.

Friedman test for All Comp by C2 blocked by C3

```
S = 75.73    DF = 12   P = 0.000
S = 115.97   DF = 12   P = 0.000 (adjusted for ties)
```

C2	N	Est Median	Sum of Ranks
1	82	4.9615	511.5
2	82	4.9615	532.5
3	82	4.8077	449.0
4	82	4.9615	557.5
5	82	4.8846	433.0
6	82	4.9615	657.0
7	82	4.9615	580.5
8	82	5.0769	691.5
9	82	4.9615	634.5
10	82	5.0385	668.5
11	82	5.0000	658.5
12	82	4.9615	616.5
13	82	4.9615	471.5

Grand median = 4.9615

Example of Logit Analysis - Input and Output

The table below shows the data as displayed in the spreadsheet.
The first column is a classification variable:
1 = ratings by educators of the importance of knowledge concepts for gen. bus. graduates
0 = ratings by educators of the importance of knowledge concepts for managers

General	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.1.6
1	2	3	3	3	3	3
1	3	3	3	3	3	4
1	3	3	3	3	3	3
1	3	3	3	2	2	2
1	3	3	2	3	3	*
0	4	4	3	3	3	3
0	3	4	3	3	3	3
0	3	4	3	3	3	3
0	4	4	3	3	3	3
0	3	3	1	3	3	*

The output below shows the partial MINITAB output for a binary logistic regression of General on the six ratings variables. The overall p-value of 0.033 shows that there are significant differences for some of the knowledge concepts in the ratings given by educators to general business students and those given by educators for future managers. In particular, the p-value of 0.008, along with its negative coefficient shows that educators consider knowledge concept #1 - cost/benefit analysis of technology acquisition to be more important to the manager than to the general business graduate.

Binary Logistic Regression

Step	Log-Likelihood
0	-110.182

Logistic Regression Table

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Constant	2.549	1.126	2.26	0.024			
3.1.1	-0.5965	0.2235	-2.67	0.008	0.55	0.36	0.85
3.1.2	-0.1809	0.2542	-0.71	0.477	0.83	0.51	1.37
3.1.3	0.0616	0.2210	0.28	0.781	1.06	0.69	1.64
3.1.4	0.1552	0.2351	0.66	0.509	1.17	0.74	1.85
3.1.5	-0.3239	0.2418	-1.34	0.180	0.72	0.45	1.16
3.1.6	0.0574	0.2525	0.23	0.820	1.06	0.65	1.74

Log-Likelihood = -103.343
Test that all slopes are zero: G = 13.677, DF = 6, P-Value = 0.033